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ABSTRACT

The purpose of this study was to determine if there was a significant difference in the readability of three collections of reading textbooks adopted for use in California for four student groups--culturally disadvantaged, slow, average, and fast. The Botel readability formula was applied to nine, 100-word samples taken from a total of twenty-four textbooks. The sign test for significant differences was applied in an inter-book comparison of readability levels of each of the nine samples across the three collections. The interquartile range was calculated for each of the nine, 100-word samples taken from the twenty-four textbooks. The findings indicated that readability levels of textbooks for culturally disadvantaged students were significantly lower than readability levels of textbooks for slow and average students in grades one, two, and three; for slow and average students were significantly higher than textbooks adopted for fast students in grades one, two and three; and for fifth grade culturally disadvantaged and slow students were significantly lower than the readability level of the textbook adopted for the fast students. Textbooks adopted for fast students achieved the best publisher's grade assignment--readability level, match. (WR)

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A STUDY OF THE READABILITY OF READING TEXTBOOKS ADOPTED FOR USE IN CALIFORNIA ELEMENTARY SCHOOLS

By

Russell W. Saunders, Jr.

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B.S. of Elem. Ed. Oregon College of Education, 1955
B.S. University of Oregon, 1955
M.S. University of Oregon, 1957

Shirley B. Finnegan

Shirley B. Finnegan, Ph.D., Advisor
Reading Specialist, Berkeley Unified
School District, Berkeley, California

A Dissertation Submitted in Partial Fulfillment of
The Requirements for the Degree of
Doctor of Philosophy

Walden University
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CHAPTER I

THE PROBLEM, DEFINITIONS, AND LIMITATIONS

Introduction

In 1969 new textbooks in reading and literature were implemented in the elementary schools of California. The textbooks were adopted and implemented after a period of three years of careful planning. The first steps in planning began in the spring of 1966 when experts in reading from California colleges and universities convened to consider the criteria for a new reading adoption. By early 1967 criteria were approved by the State Board of Education. According to the criteria, the adopted reading program should: (1) build positive attitudes, (2) develop efficient reading skills and lifelong habits of reading critically, and creatively, (3) bridge cultures and divergent socioeconomic segments, (4) provide for a wide span of abilities, (5) provide for the diagnosis and correction of reading disabilities and for the evaluation of student progress, (6) possess a scope and sequence of all reading skills in a balanced program (103:46).

Point (3) above was included in the criteria because the State recognized the student population of California schools was composed of children from many backgrounds; the student population came from different racial, ethnic,

cultural, and socioeconomic backgrounds. Figures for racial and ethnic groups in 1966 appear in the State's justification Statement and are reported below in Table 1 (103:7).

TABLE 1

ENROLLMENT IN CALIFORNIA ELEMENTARY SCHOOLS, BY RACIAL AND ETHNIC GROUPS, FALL 1966.

	Number	Percent
Spanish Surname	380,909	13.99
Other White	2,046,800	75.20
Negro	214,126	7.80
Chinese, Japanese, Korean	53,713	1.97
American Indian	7,976	.29
Other Nonwhite	18,101	.66
Total	2,721,625	99.91

From this data the State concluded it had a student population that ranged widely in learning rates, learning styles, ability to understand and express themselves in English, and in reading interests (103:6-8). The State further concluded that reading textbooks should be adopted to accommodate this diverse student population. Thus, Section 9311 of the Education Code was enacted into law by the Legislature to accomplish that purpose; for it required the adoption of more than one basic textbook (105:586).

Socioeconomic data were not stated for the groups in Table 1, or in any part of the justification Statement (103). Instead, 15 per cent of the population in Table 1 was labeled "culturally disadvantaged" by the State Office of Compensatory Education (103:9). The culturally disadvantaged and three additional student groups were identified and described in the four paragraphs that follow. Reading

textbooks were then adopted for the four groups of students described below:

Culturally Disadvantaged Group

Pupils whose score on the most recent reading test does not come up to the expectancy level determined by teacher judgment based on performance in the classroom and/or other test scores available, and who, in the opinion of the teacher, have such low reading achievement because of economic, cultural, social, or language backgrounds and resultant language disabilities or other disabilities, are in the culturally disadvantaged group. Pupils who did not take such a test within the year, but who in the opinion of the teacher indicate by their classroom performance that they fall in the culturally disadvantaged group, will be considered to be within the culturally disadvantaged group. Fifteen percent of the pupils in kindergarten and in each grade of grade one through grade eight are assumed to be culturally disadvantaged. (This assumption is based upon survey figures supplied by the Office of Compensatory Education.)

Lower Group (Slow)

Pupils who scored at or below the 25th percentile on the most recent reading test used in the state testing program and such other pupils as did not take such a test within one year of the use of the textbook by the pupil but who, in the opinion of the teachers, would, if given such a test, achieve a score within this percentile range, are within the lower group.

Middle Group (Average)

Pupils who scored from the 26th to the 75th percentiles on the most recent reading test used in the state testing program and such other pupils as did not take such a test within one year of the use of the textbook by the pupils but who, in the opinion of the teachers, would, if given such a test, achieve a score within this percentile range, are within the middle group.

Upper Group (Fast)

> Pupils who scored above the 75th percentile on the most recent reading test used in the state testing program and such other pupils as did not take such a test within one year of the use of the textbooks by the pupils but who, in the opinion of the teachers, would, if given such a test, achieve a score within those percentiles, are within the upper group (103:9-10).

The months from June 1967, to May 1968, were a period of examination and evaluation of reading textbooks, and followed the formulation of criteria and the description of groups of students. Examination and evaluation required the efforts of approximately 40,000 persons distributed throughout the State. Personnel included teachers, administrators, curriculum workers and supervisors, college and university professors, librarians, college students, laymen, and others (103:5). In May 1968, the Curriculum Commission for the State of California (and coordinating body for the adoption procedures) made its recommendations to the State Board of Education (103:1-46).

Statement of the Problem

From June 1967, to May 1968, the contents of each reading textbook series, submitted for adoption by publishers, were examined and evaluated according to nine categories titled: (1) readiness, (2) word attack skills, (3) vocabulary, (4) comprehension, (5) reading in the content

fields, (6) fine literature, (7) balanced program, (8) evaluation measures, (9) teacher's editions (103:13-27).

Four textbook series, shown in Table 2 on the next page, were recommended for adoption in the final selection process (104:6-13). Those series and the groups of students they were to serve were as follows:

The Bank Street Readers, published by the Macmillan Company, were adopted for grades one through three and were deemed appropriate for culturally disadvantaged students (1).

The Open Highways Readers, published by Scott, Foresman and Company, were adopted for grades four through six and were deemed appropriate for slow and culturally disadvantaged students (16).

The Harper and Row Basic Reading Program, published by Harper and Row, Publishers, Incorporated, was adopted for grades one through six and was deemed appropriate for average and slow students in grades one through three and also appropriate for average students in grades four through six (14).

The Macmillan Reading Program, published by the Macmillan Company, was adopted for grades one through six and was deemed appropriate for fast students (12).

All of the textbook series were described in the justification Statement (103) by employing the nine

TABLE 2

READING TEXTBOOKS ADOPTED BY THE STATE OF CALIFORNIA BEGINNING WITH THE 1969-70 SCHOOL YEAR FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment		PUBLISHER AND TITLE		
		Bank Street (CD)	Harper & Row (S&A)	Macmillan (F)
1	(1^2)	Uptown, Downtown	Real and Make Believe	Lands of Pleasure
	(1^3)		From Elephants to Eskimos	
2	(2^1)	My City	All Through the Year	Enchanted Gates
	(2^2)	Green Light Go	From Fins to Feathers	Shining Bridges
3	(3^1)	City Sidewalks	From Far Away Places	Better Than Gold
	(3^2)	Round the Corner	From Bicycles to Boomerangs	More Than Words
		Scott, Frsmn. (CD&S)	(A)	
4	(4^1)	Open Highways, Bk. 4	Trade Winds	The Magic Word
	(4^2)		From Codes to Captains	
5	(5^1)	Open Highways, Bk. 5	Crossroads	Bold Journeys
	(5^2)		From Actors to Astronauts	
6	(6^1)	Open Highways, Bk. 6	Seven Seas	Into New Worlds
	(6^2)		From Coins to Kings	

categories enumerated above. One of those categories, namely vocabulary, described the degree of vocabulary control within each of the series and the extent to which vocabulary correlated with the listening and speaking vocabularies of elementary school students. Descriptions of vocabulary usage were made in general and subjective, rather than in specific and objective terms; the statements were as follows:

> Bank Street Readers (Culturally Disadvantaged) (1)
>
> Vocabulary: The vocabulary is based on the content used in the materials and on real-life experiences outlined in the program. This approach allows the teacher to broaden and expand the child's use of words.
>
> These readers take into account the language difficulties of the disadvantaged. In its recent report, Language Arts Programs for the Disadvantaged,[1] The National Council of Teachers of English recommends greater stress on oral language for the disadvantaged child at all levels of instruction. Recognizing that these children often come to school with limited exposure to the words and concepts many children learn at pre-school age, the Bank Street program emphasizes at its earliest levels extended language experience activities in order to help children gain facility in oral language as well as to develop in them an understanding of the relationship between written and spoken words (103:24).
>
> Open Highways Readers (Slow and Culturally Disadvantaged) (16)
>
> Vocabulary: Emphasis is placed on building language through vocabulary familiar to the child and from his experiences. Shades of meaning are emphasized and facility with oral language patterns. In

[1]National Council of Teachers of English, Report of the National Council of Teachers of English Task Force on Teaching English to the Disadvantaged, Language Programs for the Disadvantaged, 1965, p. 272.

the beginning of the program sentences are short and direct but increase in complexity as the child progresses. Dictionary sections and glossary sections provide opportunities for expanding and developing vocabulary (103:26).

Harper and Row Basic Reading Program (Average and Slow) (14)

Vocabulary: The first grade vocabulary in the Harper and Row readers has been greatly expanded over basic reading programs now in use. Yet this expansion has been accomplished without the use of meaningless word lists, or the use of words which are phonetically regular and simple but which are complex in their meanings and associations. Meaning, including multiple meaning, is stressed just as much as word pronunciation or decoding. The vocabulary in both Strands I and II reflects current research and scholarly thinking in the field of reading. In the fifth grade reader all vocabulary controls are dropped and the student is encouraged to expand and enrich his knowledge of words (103:17-18).

Macmillan Reading Program (Fast) (12)

Vocabulary: Vocabulary in this series is unrestricted and an effort has been made to include words from the listening and speaking vocabulary of most children. Unusual words have been used for immediate interest and utility and additional words selected to demonstrate phonetic or structural principles (103:21).

In September 1973, a letter of inquiry was mailed by this writer to each of the three publishers of the four adopted series. The purpose of each was to discover which readability formulae, if any, had been applied in the writing of the textbooks. If no formulae had been applied, the publishers were asked to explain on what bases grade levels had been assigned to the textbooks (Appendixes I, II, III). Letters of reply were received from all three publishers.

Harper and Row Publishers took the position that most readability formulae were unsuitable for non-textbook materials and for reading textbooks; vocabulary introduced in the Harper and Row (14) textbooks, although considered "unfamiliar" by some readability formulae, becomes familiar through carefully planned teaching. The bases for assignment of grade levels to textbooks were: interest, story excitement, familiarity of situations, clarity of concepts, simplicity of syntax, and familiarity of vocabulary (Appendix IV).

Macmillan Publishing Company referred to the vocabulary lists and work done in reading by Dr. Albert J. Harris and to the readability formulae of Dale-Chall (36) and Spache (83); the content of that letter was nonspecific when referring to the works of Dr. Harris, and inaccurate when referring to the formulae of Dale-Chall and Spache (Appendix V). However, one can infer that the two formulae were applied, as appropriate: the Dale-Chall to an unspecified number of intermediate-grade textbooks, and the Spache to all primary-grade textbooks.

Scott, Foresman and Company explained that each selection had been placed in a book on the basis of suitability. Suitability was judged according to: readability rating by the Dale-Chall (36) or the Spache (83) formulae, difficult words, level of interest, background required for

interpretation, maturity of concepts, literary form, author's style, paragraph length, new vocabulary, and connectives used (Appendix VI).

In summary, this writer has attempted to show that the justification Statement (103) did not include readability ratings traditionally derived by applying objective formulae to textbook passages. This writer has also summarized information, recently supplied to him, about readability formulae and other readability factors weighed by publishers when they composed the textbooks analyzed in this study. It is important to state here that none of this information was volunteered to this writer or other committee members in 1968, for at that time this writer was a member of a committee to evaluate textbooks for the State of California. Committee members were teachers employed by the Berkeley Unified School District, Berkeley, California. In retrospect, the omission from the justification Statement (103) and from the publishers were gross and startling since readability formulae remain, to this day, one important source for measuring textbook difficulty. Thus, in 1968 readability data were not available to evaluate reading materials being selected for a heterogeneous population of nearly three million students.

Briefly stated then: the purpose of this study is

to determine if there is a significant difference in the readability of reading textbooks adopted by the State of California for four student groups in grades one through six: the culturally disadvantaged, the slow, the average, and the fast. A further purpose is to recommend procedures teachers should follow when assigning reading textbooks to students on the basis of readability data.

Need for this Study

After reading the vocabulary sections in the justification Statement this writer concluded that the evaluation of vocabulary in the four series of textbooks had been expressed in highly subjective and general terms (103:17-18, 21, 24, 26). The description of vocabulary used in the Bank Street Readers (1) and in the Open Highways Readers (16) led this writer to expect that text descriptive of real-life experiences and utilizing the syntax of spoken language would deviate significantly from the syntax in other reading textbooks; thus, vocabulary would differ measurably from other textbooks. The description of vocabulary used in the Harper and Row (14) textbooks led this writer to anticipate that an expanded vocabulary for grades one through three, and an elimination of vocabulary controls at grade five, would yield textbooks more difficult than the grade assigned them by the

publisher; thus, perhaps the textbooks would be even more difficult than the Bank Street Readers and Open Highways Readers. And last, this writer should anticipate that the Macmillan (12) textbooks, adopted for the fast group, would be significantly more difficult than the other three series because vocabulary controls had been eliminated for all textbooks in that series. In general, this writer anticipated that the readability levels of the four series of textbooks would be higher than the grade levels assigned by their publishers. Other important, but as yet unknown, differences were also expected to emerge from among the four series of textbooks. The above inferences are to be verified in this study by securing answers to the following five questions:

Is there a significant difference in the readability levels of three collections of reading textbooks adopted by the State of California for culturally disadvantaged, slow, average, and fast students?

Is there a gradual increase in the readability levels within each of the three collections of textbooks, starting with textbooks for grade one and continuing through textbooks for grade six?

When nine, 100-word samples are drawn from each textbook, will the readability levels of the samples increase

gradually, starting with the first sample and ending with the ninth sample?

Does the range of readability levels of samples drawn from textbooks vary from book-to-book within each of the three collections of textbooks, starting with the textbook for grade one and continuing through the textbook for grade six?

Is there a difference in the range of readability levels of samples drawn from the three collections of textbooks, starting with a comparison of all textbooks for grade one and continuing through all textbooks for grade six?

Hypothesis

The first question in the preceding section has been restated in the form of the null hypothesis to be tested in this study: There will be no significant difference found in the readability levels of three collections of reading textbooks adopted by the State of California for four student groups (culturally disadvantaged, slow, average, and fast). Readability levels are to be measured with the Botel (2) formula. The remaining four questions will be answered through descriptive analyses of the data within the framework of the descriptive/statistical design of this study.

Definition of Terms

For the purpose of this study the following definitions of terms have been adopted:

Textbook:	a book used in the study of reading.
Textbook series:	a group of books written for reading instruction by one publisher and designated for a range of school grades.
Three collections:	four textbook series organized for four student categories: culturally disadvantaged, slow, average, and fast.
Readability level:	a statement of comparison of vocabulary contained in reading material with vocabulary contained in a selected word list.

Limitations

All generalizations made from this study must observe the following parameters circumscribed by the design and content of this study: (1) vocabulary is the sole variable utilized in the determination of readability level, and (2) the Botel (2) formula may be inappropriate for measuring the readability levels of textbooks other than textbooks for reading instruction.

Summary

Adoption procedures and adoption criteria have been described in this chapter. The problem has been described, and questions have been posed which require answers.

Literature related to the topic of readability will be reviewed in the next chapter.

CHAPTER II

REVIEW OF THE LITERATURE

Readability Defined

An initial discussion of the topic, readability, with a group of teachers or laymen has the possibility of eliciting three categories of responses. Some persons in the group may launch into a discussion about the legibility of handwriting or typography as their perception of the components of readability. Other persons in the group may disagree and state that legibility is not so important as the interest-value of what is being read. Still, other persons in the group may point up the importance of ease of understanding (comprehension) due to style of writing. It is not the intent in this chapter to attempt to maintain the sharp lines drawn by members of the imaginary group, above; instead, the intent is to establish a broader frame of reference as a point of departure for this study. That frame of reference is to be found in the definition of readability by Gilliland. He defined readability in terms of matching the reader with materials:

> Readability is primarily concerned with a basic problem familiar to all people who choose books for

> their own use or who choose books for others to use. This is a problem of matching. On the one hand there is a collection of individuals with given interests and reading skills. On the other hand, there is a range of books and other reading materials, differing widely in content, style and complexity. The extent to which the books can be read with profit will be determined largely by the way in which the two sides are matched. For example, a person who is a competent reader may soon be deterred from reading if his choice is restricted to simple repetitive texts. Similarly, a person with limited reading ability may soon become discouraged if he is given texts which are beyond his comprehension. . . . The study of this problem of matching reader and text has come to be called 'readability' (9:12).

A widely quoted definition by Dale and Chall is probably also useful for this study even though it appears narrower in scope, less specific in detail (and therefore less practical for application); nevertheless, its value continues:

> In the broadest sense, readability is the sum total (including interactions) of all those elements within a given piece of printed material that affects the success a group of readers have with it. The success is the extent to which they understand it, read it at an optimum speed, and find it interesting (37:23).

Earliest Concerns

Early religious writings evidenced an interest in readability (or its parallel, listenability). Advocates of clear language made their point in I Corinthians 14:9, "Except ye utter by the tongue words easy to be understood, how shall it be known what is spoken? For ye shall speak into

the air." First recorded attempts to examine readability were made by religious teachers, the Talmudists, in 900 A.D. They counted words and ideas to determine frequency of occurrence; from this they could distinguish the usual from the unusual meanings and divide the reading of the Torah into weekly portions of approximately equivalent comprehension units (64:544).

In this century William S. Gray, as reported by Klare, explained that vocabulary was considered a factor in the ease of understanding when McGuffey Readers were analyzed in 1840 and graded from easiest to hardest (57:14). F. W. Kaeding, a German, constructed a word count in 1898, provided a more scientific base for relating vocabulary to reading difficulty, and established the first vocabulary list (64:545). Then in 1921 Thorndike tabulated the frequency with which words occur in print and published The Teacher's Word Book (18). That publication influenced the teaching of vocabulary in schools; later it also served as a basis for measuring readability in the first readability formulae.

Formulae Emerge

The term "readability formula" will be used in this study to refer to a " . . . method of measurement intended

as a predictive device (13:13)." " . . . a readability formula is a method of estimating the probable success a reader will have in reading and understanding a piece of writing (13:34)." The years of 1923 to 1934 were a period of the development of the first readability formulae in the United States.

The first readability formula evolved in 1923 when Lively and Pressey sought to discover the comparative vocabulary burden in textbooks, and also sought to measure the vocabulary difficulty in supplementary reading material. They sampled one-thousand-word passages and tabulated the number of different words in the sample and their frequency of occurrence. Then they assigned value to each word as given in Thorndike's Teacher's Word Book (18) and determined words not appearing in that book. Thus they developed a formula for determining readability (62).

The Lively and Pressey effort was followed by a large study of the reading preferences of 37,000 students by Vogel and Washburne. Reading preferences were matched with scores on a reading achievement test. The median reading grade scores were computed on 152 preferred books and were then used as a grade level rating for each of the books. These grade level ratings were then correlated with scores from the Lively-Pressey (62) formula. A correlation

coefficient of .80 was obtained. The work of Vogel and Washburne was significant not only because it was the first validation study of a formula element using outside criterion, but it also provided a base for these authors to construct a new readability formula (89). Klare observed:

> Their technique, ... , is of special interest because it represents the prototype of modern readability formulas.
>
> . . . . . .
>
> This formula is of particular importance because, in addition to its modern appearance, it yielded scores that correlated .845 with the reading test scores of the children who read and liked the criterion books (13:39).

Dolch (40), Lewerenz (60, 61), Johnson (54), Bear (95), Patty and Painter (74), and Thorndike (88), were some of the other investigators involved in readability research during this eleven-year period; readability research relied heavily upon vocabulary variables for predicting readability, upon Thorndike's Teacher's Word Book (18) as a basis of vocabulary difficulty, and upon the use of relatively crude criteria of reading difficulty, including polysyllabic word count and weighted-word formulae. Only minimal efforts were made to validate results (13:44).

The next period from 1934 to 1938 was marked by a diminished reliance on vocabulary lists like Thorndike's (18); in its stead, an interest emerged in variables such as sentence length and complexity, qualitative aspects of

vocabulary usage, and variety in parts of speech represented in a passage. Interest shifted to the development of readability formulae applicable to adult reading materials (13: 44-51). Noteworthy examples of researchers during this period are Ojemann (72), Dale and Tyler (38), McClusky (66), Gray and Leary (49), and Morriss and Halverson (102). An era of the so-called, efficient formulae, followed.

The period from 1938 to 1969 witnessed a shift in emphases in so-called, formula-making (13:51-81). The shift was from the complex to the simple and more efficient. This was perhaps a natural reaction after some fourteen years of experience with formulae that appeared to increase in complexity with the passage of time and with mounting research evidence. Thus, during the three decades that followed, readability formulae became more efficient by reducing the number of variables in them. Some of the older formulae currently in use, and more recent formulae, have been charted in Table 3 on the next page. The most recently developed formulae, by Fry (45) and McLaughlin (68), have stressed efficiency, that is, ease of calculation and savings of time. Pauk estimated the calculation time for the McLaughlin formula to be about ten minutes and fifteen minutes for the Fry formula (75:207).

During the same thirty-year period there was another

TABLE 3

SELECTED READABILITY FORMULAE DEVELOPED DURING THE YEARS: 1938-1969

Author/Year	Range of Difficulty (Grade)	Variables
Lorge, 1939 (63)	3-12	Sentence length Prepositional phrase "Hard" words
Flesch, 1948 (44)	3-12	"Reading Ease" Sentence length Syllable count "Human Interest" Personal words Personal sentences
Dale and Chall, 1948 (36)	3-12	Sentence length "Hard" words
Yoakam, 1951 (94)	2-14	"Hard" words
Farr, Jenkins, and Paterson, 1951 (43)	Adult	Monosyllables Sentence length
Gunning, 1952 (10)	6-12	"Fog Index" Sentence length Polysyllables
Spache, 1953 (83)	1-3	Sentence length "Hard" words
Botel, 1962 (2)	1-12	"Hard" words
Fry, 1968 (45)	1-Col.	Sentence length Syllable count
Elley, 1969 (41)	Age: 7-14+	Noun frequency count
McLaughlin, 1969 (68)	7+	"SMOG" Polysyllables

trend, namely, to develop formulae for limited areas (13:66): for example, the Spache (83) for grades one to three, the Dale-Chall (36) for grades four and above, the Flesch (7)

and Bloomer (24) for assessment of levels of abstraction, and the Botel (2) for vocabulary common to textbooks designed to teach children how to read. The suitability of formulae for limited areas was validated in 1973 by Felsenthal in a study designed to compare readability estimates of four formulae by utilizing a computer. The Spache was concluded to be best for primary grades, the Lorge (63) for junior high school, the Fry (45) for high school, and the Flesch "Reading Ease" (44) had the broadest range of coverage (96:9).

Since 1963 there has been a steady increase in the use of computers in readability research. In 1963 Danielson and Bryan derived a new formula through computer use (39). In 1970 Klare, and others, computerized the Flesch "Reading Ease" formula (58); Jacobson and MacDougall fused readability variables and programmed instruction units (51). In 1973 Moe and Arnold ascertained the readability of Newbery Award Books through computer use (101); and Harris developed a new readability formula utilizing a computer (99).

Cloze Procedure

In 1966 Bormuth criticized the quality of readability formulae. He stated:

It is problematic whether presently available

> readability formulas help more than they hinder. Because these formulas are easy and inexpensive to apply they enjoy widespread use by publishers and educators (27:81).

Three years earlier in 1963 Bormuth wrote passages at three different readability levels as computed with the Dale-Chall (36) formula. A cloze test on each passage was given to children in grades four, five, and six. Bormuth concluded that the cloze procedure was a measure of readability, and that cloze tests were valid and reliable predictors of comprehension (25:134). Gallant (47), and others, later verified those conclusions.

The cloze procedure (or technique) had been developed ten years earlier by Taylor in 1953. The term, "cloze," was derived from the term, "closure." Taylor explained:

> The . . . term is one Gestalt psychology applies to the human tendency to complete a familiar but not-quite-finished-pattern to 'see' a broken circle as a whole one . . . by mentally closing up the gaps (87:415).

When the closure theory is applied in reading to measure comprehension (and some would say readability), it involves the random or pattern deletion of words from printed passages. As Iamb described it --

> Subjects are asked to fill in the blanks with the exact word deleted. The difficulty rating for a passage is determined by counting the number and computing the percentage of blanks filled in with precisely the same word used by the original writer (100:6).

In his 1953 study Taylor compared cloze test results with the Dale-Chall (36) and the Flesch "Reading Ease" (44) formulae. He found that cloze scores ranked three passages in much the same order of readability as did the two formulae. He applied the cloze procedure to works of Gertrude Stein and James Joyce. The cloze scores indicated the passages were very difficult. By contrast, the two formulae rated the passages as easy (87:433).

Bormuth (25) followed up his 1963 study with two additional investigations; his purpose was to establish scores for multiple-choice questions, and scores for word accuracy and comprehension (on an oral reading test) that would be comparable to scores on cloze tests. Thus, in a 1967 investigation of cloze--multiple choice comparability, he concluded that cloze scores of 38 and 50 per cent were comparable to multiple-choice scores of 75 and 90 per cent, respectively (28:296-98). In a 1968 investigation of cloze--oral reading comparability, Bormuth concluded that cloze scores of 44 and 57 per cent were comparable to comprehension scores of 75 and 90 per cent, respectively; and cloze scores of 33 and 54 per cent were comparable to word accuracy scores of 95 and 98 per cent, respectively (29:196). In 1969 Rankin and Culhane replicated the two studies just described and corroborated the validity of Bormuth's

scores (76).

A note of caution was interjected by Weaver and Kingston related to the interpretation of cloze scores. A factor analysis, while showing loading of cloze tests on a comprehension factor, also showed a clearly defined redundancy factor on which all cloze tests loaded (90:259). Klare stated the problem in somewhat different terms:

> In the use of cloze tests as comprehension measures . . . missing words can be frequently restored without an 'understanding' of a passage. . . . cloze scores may well be measures of language redundancy as much as of comprehension. . . . The cloze test . . . is . . . a reliable measure. But is it an equally valid measure of comprehension? Walter MacGinitie . . . raises some doubts.[2] He points out that comprehension has been measured traditionally as the ability to ask questions about information in a passage. This kind of measurement is not without problems, notably the relative effect upon comprehension scores of the difficulty (and guessability) of the questions (apart from the difficulty of the language in the passage itself). In other words, you can ask hard questions about easy material, or easy questions about hard. In the cloze test, however, as MacGinitie points out, missing words can frequently be restored correctly without, what is usually called, an 'understanding' of a passage. All that is necessary is a recognition of familiar patterns of expression. That is, structure words can often be restored to a passage where the content words are only vaguely understood. Unless the blanks in the cloze test are appropriately selected (in much the same manner as test items) MacGinitie feels that cloze scores may well be measures of language redundancy as much as of comprehension (56:121).

[2]W. H. MacGinitie, "Comments on Professor Coleman's Paper." (paper presented at the Symposium on Verbal Learning Research and Technology of Written Instruction), Columbia University, 1966.

Three years earlier in 1963 Klare wrote of the values of cloze procedure:

> The cloze procedure is not a formula (even though it might 'predict' difficulty for a large group of readers based on results from a smaller sample). It is, however, a quick, easy and versatile testing technique that may well be used for developing criteria in the construction and validation of readability formulas (13:85).

Some limitations of the cloze procedure are obvious; for example, it is all but impossible to determine the readability of a book for these practical reasons stated by Fry:

> Were it not for the enormous amount of time this method takes, cloze procedure would be an excellent way to determine readability. In addition to the time it takes to make cloze passages, a number of different passages must be tested at the same time on the same group of children. One cannot return to the same group of children several months later, for their reading abilities will have changed and the cloze error scores will not be comparable. As a research tool the method is excellent but for practical purposes it is all but impossible to use (46: 536).

Lamb summed up the merits of the cloze procedure in a recent statement:

> While Cloze tests <u>do not</u> constitute a readability formula in the narrowest definition of that term, they do have the advantage of looking at the total linguistic structure of a selection which most readability formulas do not, . . . Cloze tests also provide important evidence regarding the level at which a given passage is understood (100:7).

Linguistic Structures

Linguistic structures (words, clauses, sentences,

longer passages) have been investigated by persons interested in the comprehension of the same by speakers, readers, and writers of English. These investigators have pursued readability studies or related studies to determine those linguistic structures which impede or facilitate comprehension. The application of cloze tests in research design, as noted in the previous paragraph, has afforded opportunities for examining the linguistic structure of a passage and its comprehensibility. Selected studies will be reviewed in this section; the studies will survey some of the aspects involved in the comprehension of linguistic structures by speakers, readers, and writers of English.

Three studies of word depth are described here. Yngve analyzed and diagrammed the structure of sentences. He hypothesized that more complex sentences impose a greater strain on the memories of the speaker and the listener. The amount of memory storage necessary to produce a sentence was called the "depth" of the sentence. Yngve assigned numerical value to each word according to its depth (position) in the sentence. The importance of this model for readability studies lies in the fact that it offered a means of assessing the complexity of sentences which can be expressed numerically (93). Botel, and others, developed a formula for evaluating complexity of syntax. The formula has been based

on a theory of transformational grammar, experimental data on children's processing of syntactic structures, and language development including performance studies of oral and written language of children. Syntactic structures have been assigned numerical values; values increase as the complexity of syntax increases (4). Bormuth tested a word-depth method of measuring grammatical complexity of sentences to see if the method could be used to predict the difficulty children have in comprehending printed materials. A computer assigned a number to each word as a measure of depth. From this effort Bormuth inferred that the word-depth measure was a powerful predictor of comprehension of materials of varying idea density or concept difficulty. He concluded that word depth was also a more powerful predictor of comprehension difficulty than mean sentence length and proportion of hard words as measured by the Dale-Chall (36) formula (26:230).

Studies of the linguistic structure of sentences have demonstrated that some structures are easier to comprehend. The cloze procedure was applied to sentences to ascertain their comprehensibility by Aborn, and others. Sentences varied in length, position, and type of words omitted. The investigators concluded that those three variables were effective sources of constraint on words in

sentences (20:180). Nominalized sentences were compared, by means of cloze tests, to their grammatical transformations using active verbs. The active-verb version was more comprehensible. The investigators were Coleman and Blumenfeld (34). Coleman replicated and expanded this study, twice. He found significant differences among categories of grammatical transformations. The differences favored active verbs, nonembedded sentences, shorter clauses, and the shorter of matched pairs of transformations (32, 33).

Units longer than sentences have been studied to ascertain their comprehensibility. Fagan studied the effects of the cloze procedure and four types of transformations on the reading comprehension of pupils in grades four, five, and six. He concluded that sentence difficulty was more dependent on the presence and difficulty of transformations than was the difficulty of the passage. This was explained in terms of the redundancy of the language:

> That is, information which an individual may miss within the boundaries of a particular sentence may be acquired within some other sentences of the passage (42:171).

The effect of linguistic variables upon readers of differing achievement levels was studied by Jefferson. Through the application of the cloze procedure he concluded that linguistic variables (lexical and structural) could be expected to predict readability equally well for poor and

good readers. He further concluded that the cloze procedure is capable of sampling lexical and structural categories. He cautioned that the nth word deletion confounds those two categories (53:177-78).

The degree of match between oral language structures of children and the syntactic structures in their textbooks has been studied; the degree of comprehension that occurs when oral and written syntactic structures are matched has also been studied. For example: oral language structures (independent clauses) produced by children were compared with the syntactic structures in elementary school reading textbooks by Strickland. She concluded that the speech of children was more sophisticated (85). Oral language structures, ranging from high to low frequency, were written into reading passages for fourth-grade children in an investigation by Ruddell. His purpose was to study the effect of the similarity of oral and written structure on reading comprehension. He concluded that reading comprehension was a function of the degree of match of oral patterns of language to the patterns of language structure in reading material. He also concluded that reading material high in low-frequency patterns was harder to comprehend (77).

Written language structures from a broad range of grade levels were studied by Smith. Students from grades

four through twelve read cloze paragraphs rewritten by their peers. Smith's purpose was to determine whether syntactically more complex structures increase reading difficulty or whether all students, regardless of grade level, have the same syntactic skills and thus read with equal facility material written at different levels of syntactic maturity. Vocabulary and content were held constant. Smith concluded that students in grades four, five, and six found fourth-grade writing easier to read than writing by more mature students. For older students, fourth-grade writing was not the easiest to read. Eighth-grade writing was most easy for older students in grades eight through twelve to read. For both groups, habit may explain the differential performance (17:52-59). In a second study Smith challenged the assumption that short sentences are an appropriate measure for the readability of passages written for older readers. He pointed out that shorter sentences may be appropriate for younger children because they match their linguistic expressions; but older students use more complex linguistic structures and therefore require more complex structures in reading materials (82:357).

This review of the literature has thus far included a functional definition of readability, an overview of formulae from the earliest to the present state of the art, an

explanation of the cloze procedure and a suggestion of its implications for readability, and a review of the research by linguists into factors that impinge on the comprehensibility of the written word. This chapter will be complete when two additional topics have been covered. Those are: the readability of subject area textbooks, and research studies and views most directly related to the design of this study.

Readability: Subject Area Textbooks

In 1949 Dale and Chall explained the limitations of readability formulae for measuring the readability of subject-area reading materials. Chall asserted that readability formulae are applicable only to material similar to the criteria on which they are based as:

> Too often this is forgotten and an attempt is made to apply a formula, based on children's reading, to materials that are beyond its range of subject matter and difficulty. . . . No studies are based exclusively on materials devoted to specialized areas such as science or mathematics (37:19-20).

Nine years later Chall observed that readability formulae based on multiple correlations (number of syllables per sentence, sentence length, etc.) tend to lose their accuracy when applied to materials from subject matter areas differing from those used in the original studies (6).

There have been critics of the misapplication of

formulae. Three instances will be cited here: the Dale-Chall (36) formula was applied in three separate studies by Brown (31), Kane (55), and Froese (97). Brown concluded the formula was inappropriate for application to science materials since much of the scientific vocabulary appeared outside the formula's list of easy words (31:164). Kane concluded the formula was inappropriate for application to mathematical textbooks. He explained that the language of mathematical textbooks differs significantly from the language in literary works--the basis of the formula's word list (55:19). Froese concluded that cloze tests were more reliable measures of language difficulty than the formula readability levels in a study of science textbook materials (97).

Numerous investigators have reported the lack of match in textbooks, that is, between the grade assigned by a publisher and the readability level assigned by formula. Smith studied the readability of mathematics textbooks for primary and intermediate grades. The Dale-Chall (36) and Spache (83) formulae were applied. He concluded that readability levels did not match the grade assigned by the publisher and that textbooks were too difficult for most of the students (81:393).

Gallaway compared the readability of reading,

language, science, and social studies textbooks for grades four, five, and six. The Dale-Chall (36) formula was applied. The reading textbooks equated with assigned grade. The remaining textbooks ranged from one to three grade levels above assigned grade (98).

Cramer and Dorsey reported a mismatch between publisher estimates and formula rating for elementary science textbooks. The Spache (83) formula was applied to six series of primary level textbooks, the Dale-Chall (36) to textbooks written for grades four, five, and six. Fourteen of the eighteen primary textbooks were correctly matched, but all of the eighteen textbooks for the middle grades were rated above grade level. The range was three to seven grades higher than the publisher's assigned grade (35:33).

The Dale-Chall (36) formula was applied to word problems in arithmetic textbooks for grade six. The ratings were compared with the readability of word problems in three, standardized, arithmetic achievement tests. The textbook readability levels were at grade; although there was a four year spread in the range of samples taken. Test item readability levels ranged from grade four to grade six. The investigator was Smith (80:562).

Ottley applied the Lorge (63) formula to science textbooks for grades four, five, and six. He concluded that

the textbooks for grade four were most difficult (poorest grade--readability match). The textbooks for grade six were the most well matched (best grade--readability match) (73: 365-66).

Efforts to simplify textbook material were reported by Williams. One unit of a science textbook for grade six was rewritten to a third-grade readability level by applying the Yoakam (94) formula. Those readers using the rewritten unit were more successful as measured by comprehension scores and reading rates (92:206).

The studies described thus far have been examples of formula readability--assigned-grade mismatches in textbooks for the elementary grades. Numerous investigators have reported similar examples of mismatches in the secondary grades. A selected few have been summarized in the following paragraphs.

The Dale-Chall (36) formula was applied in four separate studies by Belden (23), Wiegand (91), Lee and Hislop (59), and Smith (79). Belden concluded that only one of five biology textbooks was readable by a significant percentage of high school students. Reading scores were the criterion used for comparison (23). Wiegand concluded that the predicted readability of mathematics textbooks was consistently higher than the reading abilities of students.

Again, reading scores were the criterion used for comparison (91). Lee and Hislop compared the readability of special biology materials with two widely-used, general biology textbooks. They concluded all were of equal difficulty but above the reading level of students who must use them (59). Smith measured the readability of mathematics textbooks for grades seven and eight. Only six of the eleven textbooks for grade seven were matched with grade. Only five of the eleven textbooks for grade eight were matched with grade. Smith concluded the formula was inappropriate for application to mathematics textbooks (79).

The Flesch "Reading Ease" (44) formula was applied in three separate studies by Marshall (69), Janz and Smith (52), Simmons and Cox (78). Marshall rewrote passages in physics textbooks and compared comprehension scores of two groups of students. Both groups understood equally well. He concluded the formula may be inappropriate for estimating readability (69). Janz and Smith concluded that textbooks in English, science, and social studies were unsuitable for students in grades eight, nine, and ten when one year was added to reading score means and means were compared with readability ratings of textbooks (52). Using a similar design, Simmons and Cox concluded that grammar textbooks for grades seven, eight, and nine were higher in readability

than the reading scores of sixty-five per cent of the student population (78).

Negative student reactions were obtained after they read science and social studies textbooks. The "Fog" (10) formula was applied. It rated the textbooks six years higher than the reading scores of eleventh-grade students. The investigator was Symyrozum (86).

The readability of United Nations publications was studied by Michaelis and Tyler. They applied three formulae and administered a reading test of content to high school seniors. They concluded that the three formulae yielded disparate results, and the publications were too difficult for the students to understand (70).

Jacobson evaluated student understanding of passages from physics and chemistry textbooks. He concluded there was a significant difference in comprehensibility among textbooks, that the most readable textbooks were not most frequently used, and that textbooks lacked internal consistency (50).

The cloze test was applied to textbooks on American government, world history, biology, and chemistry; the difficulty of prose was found to be about the same in all textbooks. These conclusions contrasted sharply with the other studies cited here. The investigator was Beard (22).

Related Studies

Vocabulary is a crucial factor in assessing readability. Twelve formulae in use are listed in Table 3 on page 22. The reader will notice that seven of the formulae have a variable identified as so-called, hard words, or, noun frequency count. In all seven formulae, frequency of occurrence of words (word difficulty) is a variable in the measure of reading difficulty. It was explained earlier in this chapter that the Talmudists counted words and individual ideas so they could know how many times each word appeared in the scroll, that is, how many times each word appeared in an unusual sense as compared with its usual meaning (64:544). It has also been explained that in 1840 frequency of vocabulary was a factor in deciding ease of understanding in the McGuffey Readers (57:14).

There are studies which have established the fact that quote: "frequency breeds familiarity." For example, in a study by Noble of the relationship between familiarity and frequency, he presented meaningless words visually. His subjects repeated them orally. He concluded that familiarity is determined almost uniquely by frequency (71:15).

The values of word frequency are not surprising when one considers that a few words are used with high frequency, for example, in telephone conversations. In a study by

H. R. French and others, as reported by Klare, 100 words were used 75 per cent of the time in a total of 80,000 words in 500 conversations (57:13). In another study by Clyde E. Noble, as reported by Klare, the investigator concluded that in speech 100 of the most frequently occurring words make up 49 per cent of the total (57:13).

Parallels to the occurrence frequency of words used in conversational speech are found in studies of the occurrence frequency of words used in reading materials. In a study by Carroll, and others, 1,000 words were used 74 per cent of the time in a total of 86,741 different words; 5,000 words were used 89.4 per cent of the time. Samples were taken from 1,045 books for grades three to nine. Carroll, and others, explained the predicament of the English teacher faced with this situation:

> This admixture of large numbers of common words with large numbers of rare words presents a kind of paradox that is the plague of the English teacher. Of course, it is true that many of the 'rare' word types are compounds of--or are derived from--common words, but even after these are laid aside, there still remain many rare words whose meanings must be learned if the student is to attain full comprehension of verbal materials to which he is exposed (5:xxviii).

In a study of the readability of twenty-five Newbery Award books a computer was used to determine the total number of different words and their frequency. It was found that 200 words were used 61 per cent of the time from a total

of 5,443 different words. The investigators were Moe and Arnold (101:12).

Klare observed an interrelatedness of word frequency, understanding, and a hierarchy in available meanings. His observations seem to be a fitting conclusion for this part of the discussion. He stated:

> The effects of frequency of occurrence of words upon superior comprehension in more . . . readable material takes several forms. First, increased frequency itself seems to play a role, as does the corresponding increase in available meanings as frequency increases. The existence of a hierarchy among meaning frequencies apparently reduces the interference effects that might otherwise result when numbers of meanings are possible. Second, serial verbal learning appears to be improved, and perhaps free recall and other learning also. . . . Frequency of occurrence of words . . . clearly plays an all-pervasive role in language usage . . . humans . . . recognize more frequent words more rapidly than less frequent, prefer them, and understand and learn them more readily. It is not surprising, therefore, that this variable has such a central role in the measurement of readability (57:20).

Brinton and Danielson identified underlying relationships in written language which suggested theoretical bases of readability. They identified two factors. The first included word frequency, length, and word familiarity and was called the vocabulary factor. The second included sentence length and syllables and was called the sentence factor (30:423). Stolurow and Newman obtained similar results in their study of the stylistic features of printed materials. They found that relative difficulty of words

and relative sentence difficulty would account for a good deal of variance in readability (84:250).

In 1949 it was Lorge's opinion that the best single element for the prediction of any aspect of expressional difficulty is vocabulary load. "Some researchers . . . have found that an estimate of vocabulary load, in and of itself, is a sufficiently sensitive index of readability." (65:91)

The Botel (2) formula correlated at the .01 level of significance with four popular formulae in a study of the readability of selections for upper and secondary grades. The Botel formula utilized vocabulary as the only variable. The investigator in this study was Fry (45).

In another vocabulary study Botel validated his readability formula and vocabulary tests. He measured the usefulness of the Botel Word Opposites Test (3) and the Botel Word Recognition Test (3) for assigning reading textbooks to students; the level of expected student performance was set at 95--99 per cent fluency in oral reading and 75--95 per cent comprehension in silent reading. He applied the Botel formula to the paragraphs of an informal reading inventory for reading textbooks published by the Scott, Foresman Company (15); he administered a total of four reading tests (including the two Botel tests) to a randomly selected

population of thirty, fourth-grade students. He concluded that the Botel word tests and the Botel formula provided the best match for the levels of expected performance (3:25,28).

Reading skills specialists and classroom teachers of the Berkeley Unified School District, Berkeley, California, have established the validity of the Botel (2) formula--Botel (3) word-test match for determining placement of students in reading textbooks. This has been accomplished since 1970. Since that date specialists and teachers have established a practice of administering the Botel word tests and matching those results with Botel readability levels calculated for State-adopted reading textbooks. Teachers have then observed a student's comprehension level in the assigned textbook. Performance expectancy for students has been set at the levels stated in the previous paragraph.

Mata V. Bear, as reported by Klare, found that the percentage of monosyllabic words in a selection provided a fair index of reading difficulty (95:14).

The formula of Yoakam applied the weighted index of words from Thorndike's (19) The Teacher's Word Book of 30,000 Words. Vocabulary was the sole variable. The formula was last revised in 1948 (94).

In 1973 Harris described a formula for primary grades which he had developed through the application of a computer.

Word samplings were taken from six reading-textbook series and from eight content-textbook series. A core list of 2,792 words resulted. The per cent of words not on the core list was one of eight variables identified by Harris. He concluded that it correlated highest with the grade levels assigned by publishers to their books (.87). He suggested that the use of just this one variable would simplify the use of the formula. This formula awaits validation with student reading performance (99).

Cloze scores were highly correlated with hard words on two popular word lists in a study reported by MacGinitie and Tretiak. They reported that the word list of 3,000 words from the Dale-Chall (36) formula and the word list of 769 words from the Lorge (63) formula did well at predicting cloze scores of the Miller-Coleman Readability Scale (21). MacGinitie and Tretiak stated:

> The cloze criterion scores for the passages of this scale are based on restorations by college students. The summed bilateral cloze criterion scores for the Miller-Coleman passages correlate -.91 with the ratio of hard words based on the 3,000 word list and -.89 with the ratio based on the 769-word list. These higher correlations and the fact that the number of one-syllable words and the number of letters per word correlate .88 and -.90, respectively, with the Miller-Coleman criterion scores (Coleman in press),[3]

[3]E. B. Coleman, "Developing a Technology of Written Instruction: Some Determiners of the Complexity of Prose," in Verbal Learning Research and the Technology of Written Instruction, ed. by E. Z. Rothkopf and P. E. Johnson (New York: Teachers College Press, in press).

emphasize the importance of vocabulary in the prediction of the difficulty of reading passages (67:375-76).

Summary

Literature related to the topic of readability has been reviewed in this chapter. The reader learned that the topic goes beyond a discussion of such variables as legibility, interest-value, and ease of understanding. An historical perspective was drawn through a description of the evolution of readability formulae. Contrasting lines were drawn with a description of cloze procedure and linguistic structures. Restrictive lines were drawn in the review of research related to the readability of subject area textbooks; there, lines were drawn by describing the inappropriate use of some readability formulae in research. Some light was then cast on our perspective by singling out the continuing importance of vocabulary. In all of this, this writer was cautious not to attribute to vocabulary more value than it deserves in the whole, or totality, called readability. The five questions posed in the design of this study address themselves to some considerations which must become a part of that totality, if readability data sought in this study is to be applied productively in our efforts to match a reader with suitable reading materials.

A description of the readability formula applied and the preliminary study will follow in the next chapter.

CHAPTER III

METHODS AND PROCEDURES

Introduction

In the fall of 1969 the principals of the fourteen elementary schools in the City of Berkeley, California, decided they would disregard the four categories of learners described on pages 3 and 4 of this study. In discussions they concluded that classroom teachers should assign the adopted textbooks on the basis of the interests and the reading abilities of each student; these should be matched with the difficulty of textbooks. At that time this writer agreed that the reading abilities of the student should be matched with reading materials of appropriate difficulty. One obvious method for achieving a match was to apply a readability formula to determine levels of difficulty of the textbooks. This writer viewed this as an opportunity to challenge the implied assumptions, in the justification Statement (103), that one series was more suitable for a category of student than another--insofar as vocabulary was concerned. This writer decided to apply the Botel (2) formula to measure the difficulty of vocabulary in each textbook. This chapter describes the readability instrument and the preliminary analysis which followed this writer's

decision to match student reading ability with textbook difficulty.

The Instrument

The Botel (2) formula (hereafter referred to as the Formula) was selected for use in this study for a variety of reasons: (1) it was developed with words common to reading textbooks enjoying widespread use, (2) it was applicable to a wide range of reading levels commencing at grade one and extending beyond grade twelve, (3) any significant intra-text and inter-textbook differences in vocabulary usage would be readily apparent upon application of the Formula.

The development of the Formula was described in a manual published in 1962. Botel explained the steps as follows:

1. Assuming that basal readers are similar in difficulty, we made a study of the common words of five major basal reading programs at each level, from pre-primer through high third. We considered a word common at a given level if it appeared in three of the five readers. For example, since the word look appeared in at least three of the five pre-primers, we assigned look to a pre-primer level (2:8-9). [Botel referred the reader to pages 21-23 of the manual: the study to establish "Bucks County 1185 Common Words" list. See Appendix X for example.]

2. We then set out to establish a method which would compare the vocabulary of any book with typical basal readers. For example, if we should estimate the book to be beginning third level, this would mean that the

book was similar in vocabulary to the typical third grade basal reader.

3. Next, we classified samples of 100 words from 45 basal readers according to the level assigned by the '1185 Common Words' list. We used a form similar to the worksheet on page [See Appendix VII.] . . . Words not on the '1185 Common Words' list were assigned a 4+ level. When we compared the distribution of vocabulary from the same reading levels, as established by the publishers, we found this distribution to be remarkably similar. In each instance, a pattern appeared in the worksheets, or tables: Approximately nine different words in each 100 word sample were found to be above the company-assigned reading level.

   Following this pattern, we counted down nine different words and looked over to the left column for each 100 word sample. We were able to predict the reading level of 44 of the 45 basal readers within one-half grade level by using the designation in this column. In short, by the empirical observation of the pattern we found that the vocabulary distribution of primary basal readers at a given level is highly similar, ranging somewhere between eighty and ninety percent of the running words.

   In this technique, we assume that if a primary book has a vocabulary distribution pattern like that of a basal reader it has the same reading level. This, of course, is judging on vocabulary alone (2:9-10).

Botel wanted to be able to apply his Formula to materials written above third-grade level; he explained how that ability was assured:

4. . . . we tabulated 100-word samples of various reading materials: over 50 readers at the fourth, fifth, and sixth grade levels, many junior and senior high school textbooks, and many issues of Reader's Digest, Time magazine, and the New York Times. The results indicated that the total number of different words in the '4+ column' effectively indicated the reading difficulty.

   Thus we were able to establish a chart [see Appendix VIII] to use in estimating reading levels of

> intermediate and secondary materials. [See Appendix IX for sample worksheet.]
>
> Greater variability, from page to page and from story to story, was found in materials for fourth grade and above than in primary materials. Some stories in a so-called fourth grade book were as difficult as average sixth grade material, while senior high textbooks and the New York Times occasionally had materials such as found in typical sixth grade books. However, the sample of average difficulty was effective in discriminating among the levels (2:10-11).

Content validity of the Formula had been assured in Step 3 above, since 100-word samples taken from forty-five basal readers and the words on the "Bucks County 1185 Common Words" list (2:21-63) were remarkably similar in distribution. This happened because words for both sources had been drawn earlier from the Thorndike (19) list by publishers of reading textbooks.

Concurrent validity was affirmed in three studies reported earlier on pages 42 and 43 in Chapter II and repeated here. In the first study by Fry (45) the Formula correlated at the .01 level of significance with four currently-used formulae in an investigation of the readability of selections for intermediate and secondary grades. The Formula correlated at the .05 level of significance with three comprehension tests in the same study. In another investigation the two Botel (3) word tests and the Formula provided the best match for estimating reading textbook placement for fourth-grade students; the criteria were

fluency in oral reading and comprehension in silent reading (3:25,28). Since 1970, reading skills specialists and classroom teachers of the Berkeley Unified School District, Berkeley, California, have established the validity of the Formula--Botel (3) word-tests match for determining reading textbook placement for students in grades one through six. Teachers have followed up placement with observations of student comprehension of content in the assigned textbook. Comprehension standards have been set at 75--95 per cent for silent reading. Assignments have not been 100 per cent accurate, but the placement rate has been so satisfactory that the practice has been encouraged by this writer and by the reading skills specialists.

The author of the Formula urged its use as a simple and easy-to-use method of determining a readability score for general story materials; he did not recommend its use for measuring subject-matter materials. He felt its value is enhanced when the teacher knows the achievement levels of students in reading textbooks or when reading levels have been determined by the Botel (3) word tests. He cautioned that readability scores obtained by the Formula are only indirectly useful in assigning a specific book to a specific child. "For no formula has yet been devised to take into account such variables as motivation, format, illustrations,

adult assistance, and so forth." (2:3)

Preliminary Analysis

In 1970 this writer applied the Formula to a minimum of seven, 100-word passages in all of the adopted textbooks except the Open Highways Readers (16). He also applied the Fry (45) and the Spache (83) formulae to a limited number of the textbooks for intermediate and primary grade textbooks, respectively. Time did not permit the application of the Fry and Spache formulae to all textbooks. It was felt by this writer, following the application of the two formulae, that the small amount of information gained was not worth the effort expended. The Formula readability levels have been reported in Table 4; these were given to the Berkeley reading skills specialists for use and distribution to other teachers.

Summary

The readability instrument, validity studies, and the preliminary analysis have been described in this chapter.

Details of Formula application, and a statistical and descriptive analysis of the data will follow in the next chapter.

TABLE 4

READABILITY OF STATE-ADOPTED READING TEXTBOOKS: PRELIMINARY ANALYSIS OF 1970

Grade	PUBLISHER AND TITLE		
	Bank Street (CD)	Harper & Row (S&A)	Macmillan (F)
1 (1^2) (1^3)	Uptown, Downtown 2^1	Real and Make Believe 2^1 From Elephants to Eskimos 2^2	Lands of Pleasure 1^2
2 (2^1) (2^2)	My City 2^2 Green Light Go 2^1	All Through the Year 3^1 From Fins to Feathers 3^1	Enchanted Gates 2^1 Shining Bridges 2^2
3 (3^1) (3^2)	City Sidewalks 2^2 Round the Corner 2^2	From Far Away Places 3^2 From Bicycles to Boomerangs 3^1 (A)	Better than Gold 3^2 More than Words 3^2
4 (4^1) (4^2)		Trade Winds 3^2 From Codes to Captains 5	The Magic Word 4
5 (5^1) (5^2)		Crossroads 7 From Actors to Astronauts 5	Bold Journeys 6-7
6 (6^1) (6^2)		Seven Seas 6 From Coins to Kings 6	Into New Worlds 7-8

CHAPTER IV

ANALYSIS OF THE DATA

The Sampling Technique

The data secured from the preliminary analysis were reworked. In that initial analysis as few as seven, 100-word samples and as many as seventeen, 100-word samples were taken from each textbook. In the present analysis nine, 100-word samples were taken from twenty-four textbooks. Two textbooks for the Harper and Row Basic Reading Program (14) were combined into one volume at the first, fourth, fifth, and sixth grade reader levels because the textbooks in the remaining three series had only one volume at each of those grade levels.

The nine samples were located by dividing the total number of pages of text by nine. Some samples were retained from the preliminary analysis if they were reasonably close to the appropriate page number calculated for the present analysis. In some instances this was not possible so nine, new 100-word samples were taken. The Open Highways Readers (16) had not been sampled in the preliminary analysis and therefore were sampled in this study.

The starting point on each page was determined by pointing to the text with eyes closed. The first word in

each sample was the first word in the sentence to which this writer pointed. Each 100-word sample was counted at least two times by this writer to ensure accuracy of count. Words were written on worksheets and assigned a level. The accuracy of that work was checked once by this writer. The procedure has been described in the next section of this paper.

Application of the Formula

The Formula was applied to the reading textbooks in the following steps (and as demonstrated in Appendix XI). (1) Nine, 100-word samples were counted in each textbook. Initials, first names, letters, and numbers were eliminated from the count. Hyphenated words were counted as one word. The word was placed at the level of the higher element. If only one part of a hyphenated word was on the list, the word was counted as 4+. Compound names of persons and places were counted as one word. (2) Each word in the 100-word sample was checked for level against the "Bucks County 1185 Common Words" list (2:21-63). Words not on the list were assigned the level of 4+. (3) Each word in the sample was written on a worksheet. If a word appeared more than once in a sample, tally marks were placed after it. Derived forms of higher levels were listed separately; a tally mark was made after the base word when

the derived form was of the same level. (4) After the 100-word sample was placed on the worksheet, this writer counted down to the ninth word to determine the readability level. If there were nine or more words in the 4+ block a chart was used to determine the readability level (Appendix VIII). (5) After nine, 100-word samples had been placed on the worksheet, the sample of median difficulty was determined. The readability level of that sample became the readability level for that book (2:25-26).

Statistical Procedures

Five questions were posed in Chapter I. The first of the five was subjected to statistical analysis and was stated in the form of the following null hypothesis: There will be no significant difference found in the readability levels of three collections of reading textbooks adopted by the State of California for four student groups (culturally disadvantaged, slow, average, and fast). Readability levels are to be measured with the Botel (2) formula. The sign test was applied to the data to test the null hypothesis. This nonparametric test was applied to paired samples from the four textbook series. The paired samples constituted a two-category population (positive differences and negative differences) with the probability of any difference being positive--equal to the probability that

it would be negative. The null hypothesis was expressed in the following formula: $H_o : P = Q = \frac{1}{2}$; where H_o = the null hypothesis, P = the proportion of cases in one class in a two-category population, and Q = the proportion of cases in the other class of a two-category population (11:256-57).

Analysis of Results

To apply the sign test the nine, 100-word samples were paired for each textbook of the four textbook series. This required three paired groups (1-2, 2-3, 1-3). Each of the nine pairs was assigned a positive (+) sign of difference, a negative (-) sign of difference, or a neutral (0) sign. The latter indicated a perfect match. Perfect matches were subtracted from N (number = 9) and æ represented the smaller of the observed frequencies (either + or -) in a series of nine pairs. Once the values of æ and N were known, the two-tailed probability was calculated at the .05 level of significance and H_o was either accepted or rejected. See the example on the next page. In the example, nine paired samples in the textbook comparisons of Bank Street--Harper and Row and Harper and Row--Macmillan were significantly different at the 0.05 and 0.01 levels, respectively. The H_o was accepted for the Bank Street--Macmillan comparison. In Appendix XII the details of application of

Publisher's Grade Assignment		Samples	Bank Street (CD)	Cols. (1-2)	Harper & Row (S&A)	Cols. (2-3)	Macmillan (F)	Cols. (1-3)
			(1)		(2)		(3)	
1	(1^2)	1	1^2	-	2^1	+	1^2	0
		2	1^2	-	2^1	+	1^2	0
		3	2^1	0	2^1	+	1^2	+
		4	2^1	0	2^1	+	1^2	+
		5	2^1	-	2^2	+	1^2	+
		6	1^2	-	2^2	+	2^1	-
		7	1^2	-	2^2	+	1^2	0
		8	2^1	-	2^2	+	2^1	0
		9	2^1	-	3^1	+	2^1	0
		N	2^1	0/7	2^2	0/9	1^2	1/4
				.016**		.004*		1.00+

**p < .05
*p < .01
+H_o accepted

the sign test are given.

Table 5, shown on page 58, is a summary of those instances where significant differences occurred in paired samples among the three groups of textbooks shown in Appendix XII.

The results, reported in Table 5 on the next page, established that three of the five textbooks adopted for grades one, two, and three differed significantly; that is, three textbooks for the culturally disadvantaged group were easier than textbooks for the slow and average group but did

TABLE 5

SUMMARY OF SIGNIFICANT DIFFERENCES IN READABILITY AMONG STATE-ADOPTED TEXTBOOKS FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), FAST (F) STUDENT GROUPS

Publisher's Grade Assignment	(1-2) (CD)-(S&A)	(2-3) (S&A)-(F)	(1-3) (CD)-(F)
1 (1^2)	2^1-2^{2**}	2^2-1^{2*}	-
2 (2^1)	2^2-3^{1*}	3^1-2^{1**}	-
(2^2)	-	-	-
3 (3^1)	2^2-3^{1**}	-	-
(3^2)	-	-	-
	(CD&S)-(A)	(A)	(CD&S)-(F)
4	-	-	-
5	-	-	4-6**
6	-	-	-

*0.01 (two-tailed test)
**0.05 (two-tailed test)

not differ significantly when compared with textbooks for the fast group. Two of the five textbooks adopted for grades one, two, and three differed significantly in a second comparison; that is, two textbooks for the fast group were significantly less difficult than textbooks for the slow and average group. Textbooks adopted for grade five differed significantly in one comparison; that is, the textbook for the culturally disadvantaged group was significantly easier than the textbook for the fast group. The H_o was accepted for the remaining comparisons. No other significant differences were obtained.

TABLE 6

READABILITY LEVELS OF STATE-ADOPTED READING TEXTBOOKS

Publisher's Grade Assignment	Bank Street (CD)	Harper & Row (S&A)	Macmillan (F)
1 (1^2)	2^1	2^2	1^{2*}
2 (2^1)	2^2	3^1	2^{1*}
(2^2)	2^1	3^1	2^{2*}
3 (3^1)	2^2	3^{1*}	3^2
(3^2)	2^2	3^1	3^{2*}
	Scott, Frsmn. (CD&S)	(A)	
4 (4)	3^2	5	4^*
5 (5)	4	7	6
6 (6)	6*	7	8

*Readability level matches publisher's grade assignment. N = 7 (29 per cent).

Descriptive Procedures

The second question posed was: Is there a gradual increase in the readability levels within each of the three collections of textbooks, starting with textbooks for grade one and continuing through textbooks for grade six? The conclusion was a qualified, no. Table 6, shown on this page, was constructed to assist in the answering of that question; the readability levels of the textbooks have been shown in it. A visual inspection of the data revealed there was not, in all cases, a gradual increase in the readability levels within each of the three collections of textbooks for the four student groups, starting with textbooks for grade one

and continuing through textbooks for grade six. Only seven (29 per cent) of the twenty-four textbooks were matched with respect to readability level and the publisher's grade assignment. There was a noticeable absence of a gradual increase in readability levels between textbooks within the Bank Street and Harper and Row series for grades two and three. The Macmillan textbooks achieved the most gradual increase in readability levels between textbooks and thus, the best match of readability level with publisher's grade assignment.

The third question posed was: When nine, 100-word samples are drawn from each textbook, will the readability level of the samples increase gradually, starting with the first sample and ending with the ninth sample? The conclusion was, no. A visual inspection of the data in Table 7 on the next page led to the following conclusions: (1) as observed earlier, in only seven (29 per cent) of the textbooks did the readability level of the first sample match the publisher's assigned grade; (2) in ten (42 per cent) of the textbooks a minimum of one sample (between the second and eighth) was below the readability level of the first sample; (3) in four (17 per cent) of the textbooks the readability levels of the first sample and the ninth sample were identical; (4) in six (25 per cent) of the textbooks the readability level of the ninth sample was lower than the

TABLE 7

READABILITY LEVELS OF NINE, 100-WORD SAMPLES TAKEN FROM TWENTY-FOUR, STATE-ADOPTED READING TEXTBOOKS

Samples	(1^2)			(2^1)			(2^2)			(3^1)			(3^2)			(4)			(5)			(6)			Samples
	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Scott, Frsmn.	Harper & Row	Macmillan	Scott, Frsmn.	Harper & Row	Macmillan	Scott, Frsmn.	Harper & Row	Macmillan	
1	1^{2*}	2^1	1^{2*}	2^2	2^2	2^{1*}	2^{2*}	2^1	2^{2*}	3^{1*}	3^{1*}	3^2	2^2	3^1	3^1	3^1	3^2	3^2	6	9	8	3^2	4	3^2	1
2	1^2	2^1	1^2	3^1	3^1	2^1	3^1	3^1	3^1	$2^{2}_{=}$	3^1	3^2	2^2	3^1	3^2	3^2	3^2	3^2	5-	8-	7-	7	8	9	2
3	2^1	2^1	1^2	$2^{1}_{=}$	3^1	2^1	$2^{1}_{=}$	3^2	2^2	3^1	3^2	$3^{1}_{=}$	2^2	3^2	$2^{2}_{=}$	4	3^2	4	$2^{2}_{=}$	7-	6-	6	7	8	3
4	2^1	2^1	1^2	$2^{1}_{=}$	2^2	2^2	$2^{1}_{=}$	4	3^1	$2^{2}_{=}$	3^2	$2^{2}_{=}$	5	5	4	3^1	5	6	$3^{1}_{=}$	6-	7-	6	9	6	4
5	2^1	2^2	1^2	2^2	4	2^2	$2^{1}_{=}$	3^2	2^2	$2^{2}_{=}$	3^1	3^2	2^2	3^1	3^2	3^2	5	4	4-	$3^{1}_{=}$	6-	12+	7	3^2	5
6	1^2	2^2	2^1	$2^{1}_{=}$	3^1	2^2	3^2	3^1	$2^{1}_{=}$	2^2	3^1	$3^{1}_{=}$	4	6	5	3^2	$3^{1}_{=}$	6	4-	4-	6-	6	6	10	6
7	1^2	2^2	1^2	3^1	3^1	2^1	2^2	3^1	3^1	3^1	3^1	3^2	2^2	3^1	6	3^2	7	5	$3^{1}_{=}$	5-	5-	9	9	8	7
8	2^1	2^2	2^1	2^2	3^2	2^1	$2^{1}_{=}$	2^1	2^2	$2^{2}_{=}$	3^2	$2^{1}_{=}$	3^1	6	3^2	5	6	4	5-	7-	$3^{2}_{=}$	3^2	6	8	8
9	2^{1}_{+}	3^{1}_{+}	2^{1}_{+}	$\underline{2}^1$	3^{1}_{+}	3^{1}_{+}	$\underline{2}^1$	3^{2}_{+}	3^{1}_{+}	$3^{1}_{=}$	$3^{1}_{=}$	$3^{2}_{=}$	6+	$3^{1}_{=}$	$\underline{2}^2$	3^{2}_{+}	8+	6+	$\underline{4}$	$\underline{8}$	$\underline{7}$	5+	5+	6+	9
Mdn	2^1	2^2	1^2	2^2	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^2	2^2	3^1	3^2	3^2	5	4	4	7	6	6	7	8	

* Readability of first sample matched publisher's assigned grade (29 per cent).

\- Readability in at least one sample (between the second and eighth) was below the readability of the first sample (42 per cent).

= Readability of the first sample and ninth sample were identical (17 per cent).

N Readability of the ninth sample was lower than the first sample (25 per cent).

\+ Readability of the ninth sample was higher than the first sample (58 per cent).

first sample; (5) conversely, in fourteen (58 per cent) of the textbooks the readability level of the ninth sample was higher than that of the first sample.

The fourth question posed was: Does the range of readability levels of samples drawn from textbooks vary from book-to-book within each of the three collections of textbooks, starting with the textbook for grade one and continuing through the textbook for grade six? The conclusion was a qualified, yes. Tables 8 and 9, on pages 63 and 64, were constructed to determine any differences in range. The readability levels of nine, 100-word samples, drawn from each of the twenty-four textbooks, have been shown in Table 8. Each of the nine samples has been listed in rank order from the lowest readability level (rank 1) to the highest readability level (rank 9). Samples were rank ordered so that interquartile ranges could be calculated for each textbook. The interquartile range is the distance between Q_3 and Q_1 or 50 per cent of the distribution. In nine samples the value of Q_1 equals 2 (second sample) and the value of Q_3 equals 8 (eighth sample). Thus, the task was to subtract the value of sample 2 from the value of sample 8 to determine the interquartile range (8:32). To accomplish this it was first necessary to assign values of an interval scale to the readability levels of the Formula. That was done in

TABLE 8

INTERQUARTILE RANGE OF NINE, 100-WORD SAMPLES TAKEN FROM TWENTY-FOUR, STATE-ADOPTED READING TEXTBOOKS

Samples**	(1^2)			(2^1)			(2^2)			(3^1)			(3^2)			(4)			(5)			(6)			Samples**
	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Bank Street	Harper & Row	Macmillan	Scott, Frsmn.	Harper & Row	Macmillan	Scott, Frsmn.	Harper & Row	Macmillan	Scott, Frsmn.	Harper & Row	Macmillan	
1	1^2	2^1	1^2	2^1	2^2	2^1	2^1	2^1	2^1	2^2	3^1	2^1	2^2	3^1	2^2	3^1	3^1	3^2	2^2	3^1	3^2	3^2	4	3^2	1
2	1^2	2^1	1^2	2^1	2^2	2^1	2^1	2^1	2^2	2^2	3^1	2^2	2^2	3^1	2^2	3^1	3^2	3^2	3^1	4	5	3^2	5	3^2	2
3	1^2	2^1	1^2	2^1	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^1	2^2	3^1	3^1	3^2	3^2	4	3^1	5	6	5	6	6	3
4	1^2	2^1	1^2	2^1	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^1	2^2	3^1	3^2	3^2	3^2	4	4	6	6	6	6	6	4
5	2^1	2^2	1^2	2^2	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^2	2^2	3^1	3^2	3^2	5	4	4	7	6	6	7	8	5
6	2^1	2^2	1^2	2^2	3^1	2^2	2^2	3^2	3^1	3^1	3^1	3^2	3^1	3^2	3^2	3^2	5	5	4	7	7	6	7	8	6
7	2^1	2^2	2^1	2^2	3^1	2^2	2^2	3^2	3^1	3^1	3^2	3^2	4	5	4	3^2	6	6	5	8	7	7	8	8	7
8	2^1	2^2	2^1	3^1	3^2	2^2	3^1	3^2	3^1	3^1	3^2	3^2	5	6	5	4	7	6	5	8	7	9	9	9	8
9	2^1	3^1	2^1	3^1	4	3^1	3^2	4	3^1	3^1	3^2	3^2	6	6	6	5	8	6	6	9	8	12+	9	10	9
Mdn	2^1	2^2	1^2	2^2	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^2	2^2	3^1	3^2	3^2	5	4	4	7	6	6	7	8	
Q_3	20	25	20	30	35	25	30	35	30	30	35	35	50	60	50	40	70	60	50	80	70	90	90	90	
Q_1	15	20	15	20	25	20	20	20	25	25	30	25	25	30	25	30	35	35	30	40	50	35	50	35	
Range*	5	5	5	10	10	5	10	15	5	5	5	10	25	30	25	10	35	25	20	40	20	55	40	55	

*Decimals omitted

**Rank Order

TABLE 9

INTERVAL-SCALE VALUES ASSIGNED TO FORMULA READABILITY LEVELS

Formula Level	Scale Value
1^2	1.5
2^1	2.0
2^2	2.5
3^1	3.0
3^2	3.5
4	4.0
5	5.0
6	6.0
7	7.0
8	8.0
9	9.0

Table 9 above.

Thus, the interquartile range was calculated for each textbook by applying the formula $Q_3 - Q_1$; that is, sample 8 minus sample 2. For example in Table 8, Bank Street (1^2): $Q_3 = 2^1$, $Q_1 = 1^2$; therefore, $2^1 - 1^2 = 2.0 - 1.5 = .5$. Thus the interquartile range was .5 for that textbook. Interquartile ranges were calculated for the twenty-four textbooks and have been summarized in Table 10 on the next page.

A visual examination of the data in Table 10 revealed a sharp rise in the size of the interquartile range in all

TABLE 10

SUMMARY OF INTERQUARTILE RANGE OF NINE, 100-WORD SAMPLES TAKEN FROM TWENTY-FOUR, STATE-ADOPTED READING TEXTBOOKS WITH SIGN TEST APPLIED

Publisher's Grade Assignment	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1 (1^2)	.5	0	.5	0	.5	0
2 (2^1)	1.0	0	1.0	+	.5	+
(2^2)	1.0	-	1.5	+	.5	+
3 (3^1)	.5	0	.5	-	1.0	-
(3^2)	2.5	-	3.0	+	2.5	0
	Scott, Frsmn. (CD&S)		(A)			
4 (4)	1.0	-	3.5	+	2.5	-
5 (5)	2.0	-	4.0	+	2.0	0
6 (6)	5.5	+	4.0	-	5.5	0
$\frac{\Sigma}{N}$		$\frac{1}{5}$		$\frac{2}{7}$		$\frac{2}{4}$
		.376+		.454+		1.00+

+ H_o accepted

three textbook collections. This occurred in the third reader, second part (3^2). It was clear that the interquartile range varied from book-to-book within each of the three collections of textbooks.

The fifth question posed was: Is there a difference in the range of readability levels of samples drawn from the three collections of textbooks, starting with a comparison of all textbooks for grade one and continuing through all textbooks for grade six? The conclusion was a qualified, yes. In this fifth comparison interquartile ranges were compared at each grade level across the three collections shown in Table 10 on the previous page. The ranges were identical for first-grade textbooks, but this was not true at any other point in the Table. However, two of the three interquartile ranges were identical in textbooks for grade two (2^1), grade three (3^1 and 3^2), grade five (5), and grade six (6). The sign test was applied to determine if there were significant differences in the interquartile ranges of the three textbook collections (11:256-57). No significant differences were found; H_0 was accepted.

Summary

This chapter has included a description of sampling procedures, formula application, statistical methods used,

and a statistical and descriptive analysis of obtained readability data.

The next chapter will include a summary of findings and recommendations.

CHAPTER V

SUMMARY OF FINDINGS, RECOMMENDATIONS, AND EDUCATIONAL IMPLICATIONS

The Purpose Restated

The purpose of this study was to determine if there was a significant difference in the readability of reading textbooks adopted by the State of California for four student groups in grades one through six: the culturally disadvantaged, the slow, the average, and the fast. A further purpose was to suggest, on the basis of readability data, procedures teachers may follow when assigning reading textbooks to students.

Findings

Five questions were posed to answer the purpose of this study. The first question was stated in the form of a null hypothesis: There will be no significant difference found in the readability of three collections of reading textbooks adopted by the State of California for four student groups (culturally disadvantaged, slow, average, and fast). Significant differences were obtained when comparing textbooks for the culturally disadvantaged--slow and average, student groups; differences were present in three of the

five comparisons for grades one, two, and three. Significant differences were also obtained when comparing textbooks for the slow and average--fast, student groups; differences were present in two of the five comparisons for grades one, two, and three. One significant difference was obtained when comparing textbooks for the culturally disadvantaged--fast, student groups for grade five (Table 5, page 58).

The second question was posed to determine if there was a gradual increase in the readability levels within each of the three collections of textbooks. A visual inspection of readability data in Table 6 on page 59 revealed that the Macmillan textbooks achieved the most gradual increase in readability level from textbook-to-textbook.

The third question was posed to determine if there was a gradual increase in readability from the first to the ninth sample within each textbook. There was not. Readability levels fluctuated between the two samples (Table 7, page 61).

The fourth question was posed to determine if the range of readability levels within each of the textbooks was the same for the twenty-four volumes. It was not. There was an appreciable increase in range for all textbooks commencing with third reader, part two (3^2) through sixth reader (6) (Table 10, page 65).

The fifth question was posed to determine if there was a difference in readability range among the three collections of textbooks at each grade level. A visual inspection of data in Table 10 on page 65 revealed the ranges were identical only for first-grade textbooks across the three collections. There were no significant differences in the interquartile ranges when comparisons were made among the three collections.

Earlier, in Chapter I, this writer made inferences about the difficulty of vocabulary in the adopted textbooks. Those inferences were described in Chapter I under the heading "Need for this Study." They were made by this writer after he had read the vocabulary portion of the justification Statement (103:17,21,24,26). For the data described in this, and the following two paragraphs, please refer to Table 5 on page 58. In the instance of vocabulary used in the Bank Street and Open Highways readers, it had been anticipated that the vocabulary would deviate measurably from the Harper and Row and Macmillan readers--especially since the justification Statement explained that the text in the first two reader series was descriptive of real-life experiences and utilized the syntax of spoken language (103:24, 26). The resulting lower readability ratings for the Bank Street readers suggested that the textbooks were

significantly easier in three of the five comparisons with the Harper and Row readers. Only one of the Open Highways readers was noted to differ significantly from the remaining two collections. In that comparison the fifth-grade textbook was easier than the Macmillan reader adopted for the fast student group.

In the instance of the vocabulary used in the Harper and Row readers, it had been anticipated that an expanded vocabulary for grades one through three and an elimination of vocabulary controls at grade five would yield textbooks more difficult than the grade assigned them by the publisher. This was true in six of the eight volumes (Table 6, page 59). It had also been anticipated that the Harper and Row readers would be more difficult than the Bank Street and Open Highways readers. This was true in the case of the Bank Street readers as described in the previous paragraph; but the same difference did not occur in the comparisons with the Open Highways readers. Further, it had not been anticipated that the Harper and Row readers for grades one and two would have significantly higher readability ratings than the Macmillan readers adopted for the fast student group.

In the instance of the vocabulary used in the Macmillan readers, it had been anticipated that the readers would be significantly more difficult than the vocabulary in

the other two collections because vocabulary controls had, alledgedly, been eliminated for all textbooks in that series. That was not the case. Instead, only one textbook out of eight had a readability level significantly higher than the others.

This writer had anticipated that the readability of the twenty-four textbooks in the collections would be higher than the grade levels assigned by publishers. This was true in only eleven of twenty-four comparisons (Table 6, page 59).

Recommendations for Further Research

Vocabulary was the sole variable analyzed in this study. Future research should include an analysis of syntax, style, and semantic variability; reader and teacher backgrounds, interests, and degree of motivation should also be studied.

Educational Implications

Earlier in Chapter II readability was defined by Gilliland in terms of matching--matching materials differing widely in content, style, and complexity with readers who can comprehend them (9:12). Using a similar theme, Botel described readability in terms of matching pupils with books. He cited seven variables and called them <u>crucial</u> in the

matching process. The variables were: vocabulary, syntactic difficulty, style, semantic variability, reader interest, reader background, and level of motivation (106). On the same occasion, Ruddell described readability as the fit between the reader's linguistic, cognitive, and affective background and the reading materials (106).

The educational implications of this study are obvious and can be stated simply: The readability of textbooks is one important variable which can assist teachers in achieving a match or fit of materials to readers when it is weighed with other variables like those just enumerated.

The task of achieving a match has been a continuing process for the reading skills specialists and classroom teachers of the Berkeley Unified School District, Berkeley, California, since 1970. Since that date specialists and teachers have established a practice of administering word tests prepared by teachers or published tests like the Botel (3). Teachers have then compared those results with the Formula readability levels calculated for the adopted reading textbooks. Word-test results and Formula levels have been matched; then textbooks have been selected and assigned on the basis of teacher judgement regarding interest potential of content when weighed against the background and level of motivation of students. Once assigned, teachers

have then observed how well students comprehend textbook content. Performance standards were set at 95--99 per cent fluency in oral reading and 75--95 per cent comprehension in silent reading.

The procedures outlined above have been described in greater detail in Appendix XIII, on page 103, under the title: Matching Students and Books: A Handbook for Teachers.

Summary

This chapter has included a restatement of the purpose of this study, a restatement of the five questions posed with summarized findings, and recommendations for further research--extending to teacher background, interests, and motivation.

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APPENDIXES

184 Park Street
San Francisco, California
94110
September 12, 1973

Harper & Row Publishers
School Books Department
2500 Crawford Avenue
Evanston, Illinois 60201

Gentlemen:

I am a teacher in the California public schools and am writing a dissertation. My topic is an analysis of the readability of reading textbooks adopted by the State in 1968.

Did your company apply a readability formula to the Harper & Row Basic Readers? If so, which one? Can you supply me with the data?

If no readability formula was applied, on what bases were grade levels assigned to reading texts for grades one through grade six?

I shall appreciate your reply.

Sincerely yours,

R. W. Saunders Jr.

184 Park Street
San Francisco, California
94110
September 12, 1973

Macmillan Publishing Company
Editorial Department for School Books
866 Third Avenue
New York, N. Y. 10022

Gentlemen:

I am a teacher in the California public schools and am writing a dissertation. My topic is an analysis of the readability of reading textbooks adopted by the State in 1968.

Did your company apply a readability formula to the Macmillan and Bank Street Readers? If so, which one? Can you supply me with the data?

If no readability formula was applied, on what bases were grade levels assigned to reading texts for grades one through grade six?

I shall appreciate your reply.

Sincerely yours,

R. W. Saunders Jr.

184 Park Street
San Francisco, California
94110
September 12, 1973

Editorial Department/Open Highways Program
Scott, Foresman and Company
1900 Lake Avenue
Glenview, Illinois 60025

Gentlemen:

I am a teacher in the California public schools and am writing a dissertation. My topic is an analysis of the readability of reading textbooks adopted by the State in 1968.

Did your company apply a readability formula to the Open Highways Readers? If so, which one? Can you supply me with the data?

If no readability formula was applied, on what bases were grade levels assigned to reading texts for grades four through grade six?

I shall appreciate your reply.

Sincerely yours,

R. W. Saunders Jr.

Harper & Row, Publishers, Inc.
New York Evanston London

1817

School Department
2500 Crawford Avenue
Evanston, Illinois 60201
Phone: 312-866-8600

October 9, 1973

Mr. R. W. Saunders, Jr.
184 Park Street
San Francisco, California 94110

Dear Mr. Saunders:

Your letter of September 12 concerning the readability of The Harper & Row Basic Reading Program has come to my attention.

As you no doubt know, there are a variety of readability formulas; these are usually applied to non-text materials in order to discover their probable grade-level suitability. It is our professional position that such readability figures have serious limitations which make them unreliable for non-text materials and completely useless for basal reading texts.

A basal reading program by definition teaches reading. At the primary levels of The Harper & Row Basic Reading Program, for example, every word the pupil reads is carefully taught before he sees it in the text; each word is used in the pupil's materials many times thereafter. If one of these words is not included on the vocabulary list for a certain readability formula, it must be considered "unfamiliar" and it therefore increases the difficulty level according to the formula. However, our carefully planned teaching leads us to be certain that such words as are used in our basal readers are completely familiar.

Therefore, the basis on which our texts have been assigned to grades is their instructional level. We have taken into consideration such factors as interest, story excitement, familiarity of situations, clarity of concepts, and simplicity of syntax, as well as familiarity of vocabulary.

I hope this is of some help to you.

Sincerely,

Bradley Hannan

(Mrs.) Bradley Hannan
Editor, Reading Department

BH:s

MACMILLAN PUBLISHING CO., INC.
866 Third Avenue, New York, N.Y. 10022

SCHOOL DIVISION

October 3, 1973

Mr. R. W. Saunders, Jr.
184 Park Street
San Francisco, Calif. 94110

Dear Mr. Saunders:

In response to your inquiry of September 12, concerning the formula for readability used by Macmillan, let me direct you to the work done by Dr. Albert J. Harris on reading and vocabulary lists.

In addition to this information you will want to know that Macmillan utilizes the readability levels devised by Chall for most primary texts and that devised by Spache for certain of the intermediate reading levels.

You have our good wishes for continuing success in your studies.

Sincerely,

K. O'Rourke

Ms. K. O'Rourke
Marketing Manager

KO'R/as

cc: C. Boultinghouse

RESEARCH AND INFORMATION

OPEN HIGHWAYS: Criteria for Judging Reading Difficulty

Every selection included, or considered for inclusion, in the OPEN HIGHWAYS books was measured by a standard readability formula--the Spache (primary) or the Dale-Chall. Each selection chosen was placed in the book and the section of the book for which it was adjudged suitable as to reading difficulty, according to the formula.

The Dale-Eichholz list was used in adapting material, and wherever possible words from this list that are familiar to 67 per cent or more of fourth-graders, for example, were substituted for words judged "difficult" by formula.

However, the consideration of readability for a given level did not end with the application of the formula. Such factors as the following were also taken into account:

level of interest
background needed for full interpretation
maturity of concepts
literary form
author's style
paragraph length
new vocabulary

Many linguists believe that the removal of connectives, such as and, but, and because, in order to shorten sentences, actually increases difficulty. The connectives clue the child to cause-effect, sequence, and analogous relationships. This, too, was carefully considered in the evaluation of sentence length.

In some cases, a selection that checked out at the expected readability level, according to the formula, was actually placed in a later book (or later in a book) because of the various factors considered. For example, Burma Boy, which appears in OPEN HIGHWAYS, Book 6, is of low reading difficulty, according to the formula, but the concepts and foreign settings led us to place it where it is.

To the best of our knowledge and belief, selections in OPEN HIGHWAYS are at the level indicated for each book and section.

S-R-253
11/66

Primary Readability Worksheet

Book: *Frogs and Toads*
Publisher: *Follett Publishing Company*
Botel Readability Score: *3-2*

Word Level	SAMPLE 1 pp. 8-9 Level: 3-1	SAMPLE 2 pp. 18-19 Level: 3-2	SAMPLE 3 p. 28 Level: 3-2
4th Reader & above 4+	swamp throat size match 4	crops mosquitoes common leopard 11 swamps creeks 8	toads 11111 hawks crows snakes mosquitoes 10
High 3rd Reader 3-2	wake 1	insects twelve inches 1 less 5	search insects 1 during enemies inch 6
Beg. 3rd Reader 3-1	frogs 11111 1 lake begins 1 puffs 11	frog 11111 11 helpful because rings lakes 12	grown rock earth 3
High 2nd Reader 2-2	winter leaves holes pond sing 11 hear sure lay 1 11	hurt legs food most 1 parts only spots 1 ponds world 11	leave hop most catch fall years winter hole ground warms 10
Beg. 2nd Reader 2-1	spring 1 their 1 or balloon sign 7	which or found 1 near country grow an 8	grow an or until spring 5
1st Reader & Below	11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 1 66	11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 1 56	11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 1 66
Total Word Sample	100	100	100

Estimating Reading Levels of Intermediate and Secondary Materials[1]

No. of Different Words Beyond 3-2 Level	Predicted Reading Level
9-10	4th
11-12	5th
13-15	6th
16-18	7th
19-22[2]	8th
23-26[3]	9th
27-30	10th
31-33	11th
34+	12th

[1] Average difficulty means that if three 100-word samples are taken to evaluate the reading level of a book, the sample of median difficulty would be used to determine reading level by this table. For example, if in three samples you got 18, 15, 16 words appearing beyond 3-2 level, you would use 16 to predict the reading level of the book.

[2] *Reader's Digest* samples averaged 21 different words in the 4+ column.

[3] *Time* magazine samples averaged 23 different words in the 4+ column. *New York Times* samples averaged 28 different words in the 4+ column.

Intermediate and Secondary Worksheet

Book: *George Washington, Leader of the People*
Publisher: *Follett Publishing Company*
Botel Readability Score: *7th*

Word Level	SAMPLE 1 p. 33 Level: 6th	SAMPLE 2 p. 131 Level: 7th	SAMPLE 3 p. 175 Level: 7th
4th Reader & above 4+	admiral allowed Creek 11 shocked grinned understandingly holidays modest Pope's business raising colony erect TOTAL WORDS: 15 DIFFERENT WORDS: 13	crop manure mixtures enrich soil tinkled grinned business evening creek flooded slave mansion Washington 1 dam mill TOTAL WORDS: 17 DIFFERENT WORDS: 16	Pope's Creek stirred merely tossing strolled general pitched yelled approval cheered Washington rounders square bases batter TOTAL WORDS: 16 DIFFERENT WORDS: 16
High 3rd Reader & Below	85	83	84
Total Word Sample	100	100	100

Graded Vocabulary List

a

alone 2-2
along 2-1
*aloud 3-1
already 3-2
also 3-1
always 2-1
am *p*
among 3-2
amount (s, ed, ing) 3-2
an 2-1
and *pp*
angry 2-2
animal (s) *1*
another 2-1
answer (s, ed, ing) 2-2
any 2-1
*anybody 3-2
*anyhow 3-2
*anyone 3-2
*anything 3-2
*anyway 3-2
*anywhere 3-2
apple (s) *1*
apron (s) 2-2

WORKSHEET FOR DETERMINING READABILITY OF 100-WORD SAMPLES

Book: Bold Journeys Pub.: Macmillan Readability: 6

Word Level	SAMPLE 1 p. 64 Level 8	SAMPLE 2 p. 114 Level 7	SAMPLE 3 p. 171 Level 6
4+	exploring lie wilderness painfully territory actually map original two-thirds United States America wonderland Colonists westward sparkled underfoot eighteenth century Ohio (20)	redden glanced Boston hospitality miner forgave coffee pitch-pine led weathered canvas pitched slope coffee / merrily cans (17)	members royal merchants sums actually convinced villagers Hurkin American / wrote Balkans described produce Selo (15)
3^2	except plains deserts peaks bounced (5)	air taste / pot boiling (5)	anything indeed slip (3)
3^1	forests // rich stretched ocean / shores lakes mountains toward earth (12)	felt life week month gold cup tent tin (8)	three wholly month (3)
2^2	covered // great rivers late road (7)	face filled used even air hole pan (7)	only earning / family magic such wonders than / else really everything (12)
2^1	above highest made clean growing (6)	I'm thought maybe until fine along (6)	city paper take letter money / started hand people more // gone country (14)
Below 2^1	𝍸 𝍸 𝍸

WORKSHEET FOR DETERMINING READABILITY OF 100-WORD SAMPLES

Book: Gold Journeys Pub.: Macmillan Readability:

Word Level	SAMPLE 4 p. 231 Level 7	SAMPLE 5 p. 285 Level 6	SAMPLE 6 p. 344 Level 6
4+	lengths gaily rail o'clock / approaching western Central / Pacific III Union / last decorated railroad rails complete Chinese began leveling leveled (24)	Swedish kaffekalas socker i kaffet coffee to task ward / forty tea party unlocked alphabet (14)	meaningful pleasure usually information / study different history geography science / arithmetic require skills suggestions yourself unit / (17)
3^2	engine arrived pair eleven (4)	question (1)	key special (2)
3^1	laid crowded nine companies line final between (7)	words sugar III given lady trouble because secrets (10)	(0)
2^2	only lay / needed early whittle later workmen carrying (9)	answer II sailed understand wonder year / (8)	most kinds learning often learn / taste understand remember (9)
2^1	more town people each brought bed / ties (8)	through miss / beat another after (6)	reading / something people (9)
Below 2^1	48	61	63
	T 100	100	100

WORKSHEET FOR DETERMINING READABILITY OF 100-WORD SAMPLES

Book: Bold Journeys Pub.: Macmillan Readability:

Word Level	SAMPLE 7 p. 399 Level 5	SAMPLE 8 p. 456 Level 3²	SAMPLE 9 p. 509 Level 7
4+	motion center robot / direction Erg // tune appeared electronic engineer dial / basement mechanism (15)	substitute taught obstacles thus lie (5)	immediately vanished blazing abandoned dreamed antelopes Gazelles Sanderson / sun-blazed long-melted forgotten spun tennis faded jungle heat bent echo (19)
3²	(0)	scold colt / among none (5)	whisper creatures leaping brush (4)
3¹	signal / noise trouble pop few (6)	lead touches / loge / touched (6)	almost empty sky (3)
2²	moving family / bought whistled / happened great changes (9)	step learn such clowns / trips sisters even stepped that listen grass whenever (13)	stood / sound / ago heavy shly listening soft remembered left moving pick winter (14)
2¹	ok both sends someone / starts talked any / an knew (11)	care nothing ready ever (4)	off beautiful gone through their behind (6)
Below 2¹	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 //// (59) T 100	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 // (67) 100	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 //// (54) 100

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment		Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1	(1^2)	1	1^2	-	2^1	+	1^2	0
		2	1^2	-	2^1	+	1^2	0
		3	2^1	0	2^1	+	1^2	+
		4	2^1	0	2^1	+	1^2	+
		5	2^1	-	2^2	+	1^2	+
		6	1^2	-	2^2	+	2^1	-
		7	1^2	-	2^2	+	1^2	0
		8	2^1	-	2^2	+	2^1	0
		9	2^1	-	3^1	+	2^1	0
		N	2^1	7	2^2	0	1^2	1
				.016**		.004*		1.00+
2	(2^1)	1	2^2	0	2^2	+	2^1	+
		2	3^1	0	3^1	+	2^1	+
		3	2^1	-	3^1	+	2^1	0
		4	2^1	-	2^2	0	2^2	-
		5	2^2	-	4	+	2^2	0
		6	2^1	-	3^1	+	2^2	-
		7	3^1	0	3^1	+	2^1	+
		8	2^2	-	3^2	+	2^1	+
		9	2^1	-	3^1	0	3^1	-
		N	2^2	0	3^1	0	2^1	3
				.032**		.016**		1.00+

**p < .05
*p < .01
+H_o accepted

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment		Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
2	(2^2)	1	2^2	+	2^1	-	2^2	0
		2	3^1	0	3^1	0	3^1	0
		3	2^1	-	3^2	+	2^2	-
		4	2^1	-	4	+	3^1	-
		5	2^1	-	3^2	+	2^2	-
		6	3^2	+	3^1	+	2^1	+
		7	2^2	-	3^1	0	3^1	-
		8	2^1	0	2^1	-	2^2	-
		9	2^1	-	3^2	+	3^1	-
		Mdn	2^1	2/7	3^1	2/7	2^2	1/7
				.454+		.454+		.124+
3	(3^1)	1	3^1	0	3^1	-	3^2	-
		2	2^2	-	3^1	-	3^2	-
		3	3^1	-	3^2	+	3^1	0
		4	2^2	-	3^2	+	2^2	0
		5	2^2	-	3^1	-	3^2	-
		6	2^2	-	3^1	0	3^1	-
		7	3^1	0	3^1	-	3^2	-
		8	2^2	-	3^2	+	2^1	+
		9	3^1	0	3^1	-	3^2	-
		Mdn	2^2	0/6	3^1	3/8	3^2	1/7
				.032**		.726+		.124+

**p < .05
+H_o accepted

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment		Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
3	(3^2)	1	2^2	-	3^1	0	3^1	-
		2	2^2	-	3^1	-	3^2	-
		3	2^2	-	3^2	+	2^2	0
		4	5	0	5	+	4	+
		5	2^2	-	3^1	-	3^2	-
		6	4	-	6	+	5	-
		7	2^2	-	3^1	-	6	-
		8	3^1	-	6	+	3^2	-
		9	6	+	3^1	+	2^2	+
		N =	2^2	1/8	3^1	3/8	3^2	2/8
				.070+		.726+		.290+

+H_o accepted

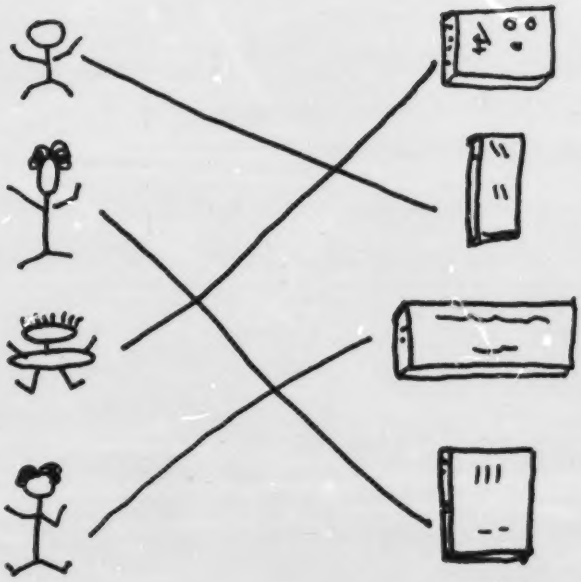
Publisher's Grade Assignment		Samples	Scott, Fres. (CD&S) (1)	Cols. (1-2)	Harper & Row (A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
4	(4)	1	3^1	+	3^2	0	3^2	-
		2	3^2	0	3^2	0	3^2	0
		3	4	+	3^2	-	4	0
		4	3^1	-	5	-	6	-
		5	3^2	-	5	+	4	-
		6	3^2	+	3^1	-	6	-
		7	3^2	-	7	+	5	-
		8	5	-	6	+	4	+
		9	3^2	-	8	+	6	-
		N =	3^2	3/8	5	3/7	4	1/7
				.726+		1.00+		.124+

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment		Samples	Scott, Frsmn (CD&S) (1)	Cols. (1-2)	Harper & Row (A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
5	(5)	1	6	-	9	+	8	-
		2	5	-	8	+	7	-
		3	2^2	-	7	+	6	-
		4	3^1	-	6	-	7	-
		5	4	+	3^1	-	6	-
		6	4	0	4	-	6	-
		7	3^1	-	5	0	5	-
		8	5	-	7	+	3^2	+
		9	4	-	8	+	7	-
		N	4	1/8	7	3/8	6	1/9
				.070+		.726+		.04**
6	(6)	1	3^2	-	4	+	3^2	0
		2	7	-	8	-	9	-
		3	6	-	7	-	8	-
		4	6	-	9	+	6	0
		5	12+	+	7	+	3^2	+
		6	6	0	6	-	10	-
		7	9	0	9	+	8	+
		8	3^2	-	6	-	8	-
		9	5	0	5	-	6	-
		N	6	1/6	7	4/9	8	2/7
				.218+		1.00+		.454+

**p < .05
+H_o accepted

MATCHING STUDENTS AND BOOKS



A HANDBOOK FOR TEACHERS

- Purpose -

The purpose of this handbook is to recommend alternative methods for making instructional decisions about student placement in reading textbooks.

Prepared by: R. H. Saunders Jr., Coordinator of Reading, Berkeley Unified School District, Berkely, California.

-- OVERVIEW OF CONTENT --

Readability levels: Using vocabulary as the variable, the Botel readability formula* was applied to State-adopted reading textbooks.

Teacher-prepared tests: Word-recognition tests were prepared at each reader level by sampling every nth word to construct a list of twenty vocabulary words.

Word-opposites tests were prepared at each reader level by sampling words from each reader and constructing ten test items at each level.

Suggestions for student placement: Procedures for placement will be described. These have been validated by staff in the Berkeley Schools.

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*Morton Botel. Predicting Reading Levels. Chicago: Follett Publishing Company, 1962.

READABILITY OF STATE-ADOPTED READING TEXTBOOKS

Grade		PUBLISHER AND TITLE					
		Bank Street (CD)		Harper & Row (S&A)		Macmillan (F)	
1	(1^2)	Uptown, Downtown	2^1	Real and Make Believe	2^1	Lands of Pleasure	1^2
	(1^3)			From Elephants to Eskimos	2^2		
2	(2^1)	My City	2^2	All Through the Year	3^1	Enchanted Gates	2^1
	(2^2)	Green Light Go	2^1	From Fins to Feathers	3^1	Shining Bridges	2^2
3	(3^1)	City Sidewalks	2^2	From Far Away Places	3^1	Better than Gold	3^2
	(3^2)	Round the Corner	2^2	From Bicycles to Boomerangs	3^1	More than Words	3^2
		Scott, Frsmn. (CD&S)		(A)			
4	(4^1)	Open Highways,		Trade Winds	3^2	The Magic Word	4
	(4^2)	Bk. 4	3^2	From Codes to Captains	5		
5	(5^1)	Open Highways,		Crossroads	7	Bold Journeys	6-7
	(5^2)	Bk. 5	4	From Actors to Astronauts	5		
6	(6^1)	Open Highways,		Seven Seas	6	Into New Worlds	7-8
	(6^2)	Bk. 6	6	From Coins to Kings	6		

-- RECOMMENDATIONS FOR STUDENT PLACEMENT --

Three categories of recommendations are explained below: (1) Minimum service to students, (2) Additional service, (3) Other alternatives.

Minimum Service

1. CHOOSE an appropriate reader series. Administer and score the word-recognition test for that series.

2. MATCH instruction level with the textbook having the same readability.

3. ASSIGN textbook and observe student's progress. Apply standards: 95--99 per cent oral reading accuracy, 75--95 per cent comprehension of silent reading.

Additional Service

1. FOLLOW Step 1 above.

2. ADMINISTER word-opposites test. Combine results of both tests.

3. MATCH instructional levels with textbook having the same readability.

4. ADMINISTER criterion-reference test which accompanies the textbook series. Evaluate results.

5. FOLLOW Step 3 under "Minimum Service."

Other Alternatives

1. CONSTRUCT word tests for other basal reader series. Use the same selection procedures for words, or administer the Botel inventory.*

2. APPLY the Botel readability formula or another formula to textbooks.

3. FOLLOW Steps 3, 4, and 5 under "Additional Service."

*Morton Botel. Botel Reading Inventory, Follett Pub.,Co., 1962.

BERKELEY UNIFIED SCHOOL DISTRICT
CURRICULUM CENTER

Harper
Word Opposites (Group) Test
(Grades 3-6)

Prepared by: Russell Saunders, Consulting Teacher

ANSWER KEY AND SCORING STANDARDS

Level	Text
A (1)	JANET AND MARK; OUTDOORS & IN; CITY DAYS, CITY WAYS; JUST FOR FUN; AROUND THE CORNER; REAL AND MAKE BELIEVE
B (1-3)	FROM ELEPHANTS TO ESKIMOS
C (2-1)	ALL THROUGH THE YEAR
D (2-2)	FROM FINS TO FEATHERS
E (3-1)	FROM FAR AWAY PLACES
F (3-2)	FROM BICYCLES TO BOOMERANGS
G (4)	TRADE WINDS
H (5)	CROSSROADS
I (6)	SEVEN SEAS

Scoring Standards

READING LEVELS	No. of words correct out of 10	% of accuracy
Free Reading Levels (Easy: Pupil can read with profit without any teacher help.)	10 9	100 90%
Instructional Levels (Suitable: Pupil usually needs teacher guidance for comprehension and interpretation).	8 7	80% 70%
Frustration Levels (Too difficult: Pupil cannot read with profit even with teacher help.)	65% - 0	60% - 0

NOTE

The readability of the stimulus word and the response word is stated in brackets in the answer key. Example: Look at level A, item 1

1. Up (pp) little down (pp) you
   ↖ Stimulus Word level ↖ Response Word level

The remaining words in each question are of the level of the stimulus word. The [1] Botel formula was used to determine readability of all the words in this test.

[1] Botel, Morton Botel Predicting Readability Levels, Follett Publishing Co., Chicago, 1962.

Harper

Harper

WORD OPPOSITES TEST

Directions: Pick a word in each line which means the opposite or nearly the opposite of the numbered word. Draw a line under it.
Example: 1. no oh yes not

NAME _____

DATE _____

TEACHER _____

A	a	b	c
1. up (pp)	little	down (pp)	you
2. girl (pp)	get	play	boy (pp)
3. came (p)	good	this	went (p)
4. old (1)	door	new (1)	happy
5. day (1)	work	black	night (1)
6. town (2-1)	before	country (2-1)	right
7. show (2-1)	grow	ready	hide (2-2)
8. softly (2-2)	warm	wet	loudly (2-2)
9. earth (3-1)	sky (3-1)	lady	inside
10. master (3-2)	born	slave (+)	mad

SCORE _____ %

B	a	b	c
1. gave (1)	live	baby	took (1)
2. ask (1)	open	tell (1)	children
3. plants (2-1)	use	animals (1)	together
4. does (2-1)	more	summer	doesn't (2-1)
5. learned (2-2)	drink	forgot (2-2)	pay
6. sell (2-2)	hard	winter	buy (3-1)
7. most (2-2)	answer	few (3-1)	sang
8. below (3-1)	pour	above (2-2)	slow
9. almost (3-1)	hardly (3-1)	close	rainy
10. melted (+)	separate	die	frozen (+)

SCORE _____ %

C	a	b	c	d
1. go (pp)	take	stop (p)	are	do
2. I'm (2-1)	you're (2-1)	dinner	sell	nearer
3. nothing (2-1)	crying	hasn't	something (2-1)	glad
4. stands (2-1)	high	summer	floor	sits (2-1)
5. great (2-2)	small (2-2)	moving	winter	shouted
6. early (2-2)	remembered	late (2-2)	soft	answer
7. broken (3-1)	dad's	returns	fixed (3-1)	speak
8. locks (3-2)	path	unlocks (+)	fear	arrives
9. blamed (+)	waked	vacation	lose	praised (+)
10. kid (+)	adult (+)	blazing	ceiling	frown

SCORE _____ %

D	a	b	c	d
1. sitting (2-1)	both	through	standing (2-1)	larger
2. rope (2-2)	string (2-2)	strange	poor	hurt
3. brother (2-2)	dear	won	sister (2-2)	sound
4. held (3-1)	promise	minds	whole	dropped (3-1)
5. nice (3-1)	mean (3-1)	mountains	bodies	true
6. stuck (3-2)	fear	unstuck (+)	alive	weak
7. either (+)	lies	parent	neither (+)	impossible
8. copies (+)	fancy	original (+)	dryness	defend
9. groups (+)	separated	nurse	raw	individuals (+)
10. reward (+)	penalty (+)	difference	dull	occasionally

SCORE _____ %

E		a	b	c	d
1.	behind (2-1)	near	before (2-1)	more	hungry
2.	quiet (2-2)	sound	stood	grew	loud (2-2)
3.	half (3-1)	lot	drop	handful	whole (3-1)
4.	vegetables (3-1)	meats (3-1)	safe	inquire	thin
5.	stupid (3-2)	explain	smart (3-2)	favorite	choose
6.	nibble (3-2)	break	gobble (3-2)	hollow	insist
7.	policeman (+)	peace	save	criminal (+)	normal
8.	fortune (+)	jewels	borrower	misfortune (+)	trinkets
9.	native (+)	foreigner (+)	soak	tickled	inedible
10.	problems (+)	pressing	solutions (+)	tore	healthy

SCORE _____ %

F		a	b	c	d
1.	she's (2-1)	does	he's (2-1)	you'll	hand
2.	spoke (3-1)	reach	paw	noticed	listened (2-2)
3.	pen (3-2)	chief	fighting	daughter	brush (3-2)
4.	boss (+)	employee (+)	strength	boomed	firmly
5.	modern (+)	examine	midget	antique (+)	circular
6.	exhausted (+)	purpose	energetic (+)	involve	charge
7.	prisoner (+)	fertile	captor (+)	cleared	mild
8.	firmly (+)	finally	serious	weakly (+)	vote
9.	gently (+)	roughly (+)	glide	breeze	wobbly
10.	valuable (+)	collect	stir	prefer	worthless (+)

SCORE _____ %

G		a	b	c	d
1.	mean (3-1)	fairly	loving (3-1)	ocean	nine
2.	Whisper (3-2)	nod	beyond	howl (3-2)	renew
3.	nobody (3-2)	sir	lettuce	enter	somebody (3-2)
4.	castle (3-2)	explain	cottage (3-2)	yesterday	worried
5.	several (3-2)	salt	tale	none (3-2)	bundle
6.	daughter (3-2)	careless	son (3-1)	insect	unless
7.	expert (+)	utter	vague	amateur (+)	compute
8.	cellar (+)	tunic	attic (+)	herb	leizure
9.	disturb (+)	host	bade	catapult	soothe (+)
10.	precious (+)	worthless (+)	hitch	violent	narrow

SCORE _____ %

H		a	b	c	d
1.	moisture (+)	thicket	dryness (+)	resist	mutter
2.	composite (+)	single (+)	compete	honey	jade
3.	imitate (+)	increase	lizard	create (+)	envy
4.	abundant (+)	ruffle	hostile	anxious	scarce (+)
5.	tender (+)	harsh (+)	trickle	rubble	extinct
6.	wither (+)	wit	flourish (+)	equip	resist
7.	foreign (+)	district	majesty	domestic (+)	fossil
8.	unique (+)	urban	similar (+)	chant	lute
9.	reprove (+)	disrupt	justice	request	praise (+)
10.	perplex (+)	clarify (+)	stammer	pearl	greed

SCORE _____ %

I	a	b	c	d
1. calm (+)	tradition	hysterical (+)	appraise	cord
2. sullen (+)	summon	herb	amiable (+)	robust
3. temporary (+)	utter	tension	permanent (+)	tow
4. delicate (+)	rough (+)	drone	majesty	robot
5. horizontal (+)	miracle	ancestor	hoax	vertical (+)
6. advantage (+)	aloft	obstacle (+)	logic	longitude
7. fantastic (+)	depot	finance	ordinary (+)	navigate
8. defend (+)	emanate	duct	narrate	attack (+)
9. praise (+)	port	reproach (+)	gesture	kin
10. ascent (+)	jade	discus	descent (+)	vise

SCORE _____ %

Harper

Harper

WORD OPPOSITES TEST

Directions: Pick a word in each line which means the opposite or nearly the opposite of the numbered word. Draw a line under it.
Example: 1. no oh yes not

NAME _____

DATE _____

TEACHER _____

A	a	b	c
1. up	little	down	you
2. girl	get	play	boy
3. came	good	this	went
4. old	door	new	happy
5. day	work	black	night
6. town	before	country	right
7. show	grow	ready	hide
8. softly	warm	wet	loudly
9. earth	sky	lady	inside
10. master	born	slave	mad

SCORE _____ %

B	a	b	c
1. gave	live	baby	took
2. ask	open	tell	children
3. plants	use	animals	together
4. does	more	summer	doesn't
5. learned	drink	forgot	pay
6. sell	hard	winter	buy
7. most	answer	few	sang
8. below	pour	above	slow
9. almost	hardly	close	rainy
10. melted	separate	die	frozen

SCORE _____ %

C	a	b	c	d
1. go	take	stop	are	do
2. I'm	you're	dinner	sell	nearer
3. nothing	crying	hasn't	something	glad
4. stands	high	summer	floor	sits
5. great	small	moving	winter	shouted
6. early	remembered	late	soft	answer
7. broken	dad's	returns	fixed	speak
8. locks	path	unlocks	fear	arrives
9. blamed	waked	vacation	lose	praised
10. kid	adult	blazing	ceiling	frown

SCORE_____%

D	a	b	c	d
1. sitting	both	through	standing	larger
2. rope	string	strange	poor	hurt
3. brother	dear	won	sister	sound
4. held	promise	minds	whole	dropped
5. nice	mean	mountains	bodies	true
6. stuck	fear	unstuck	alive	weak
7. either	lies	parent	neither	impossible
8. copies	fancy	original	dryness	defend
9. groups	separated	nurse	raw	individuals
10. reward	penalty	difference	dull	occasionally

SCORE_____%

E	a	b	c	d
1. behind	near	before	more	hungry
2. quiet	sound	stood	grew	loud
3. half	lot	drop	handful	whole
4. vegetables	meats	safe	inquire	thin
5. stupid	explain	smart	favorite	choose
6. nibble	break	gobble	hollow	insist
7. policeman	peace	save	criminal	normal
8. fortune	jewels	borrower	misfortune	trinkets
9. native	foreigner	soak	tickled	inedible
10. problems	pressing	solutions	tore	healthy

SCORE _____ %

F	a	b	c	d
1. she's	does	he's	you'll	hand
2. spoke	reach	paw	noticed	listened
3. pen	chief	fighting	daughter	brush
4. boss	employee	strength	boomed	firmly
5. modern	examine	midget	antique	circular
6. exhausted	purpose	energetic	involve	charge
7. prisoner	fertile	captor	cleared	mild
8. firmly	finally	serious	weakly	vote
9. gently	roughly	glide	breeze	wobbly
10. valuable	collect	stir	prefer	worthless

SCORE _____ %

G	a	b	c	d
1. mean	fairly	loving	ocean	nine
2. Whisper	nod	beyond	howl	renew
3. nobody	sir	lettuce	enter	somebody
4. castle	explain	cottage	yesterday	worried
5. several	salt	tale	none	bundle
6. daughter	careless	son	insect	unless
7. expert	utter	vogue	amateur	compute
8. cellar	tunic	attic	herb	leizure
9. disturb	host	bade	catapult	soothe
10. precious	worthless	hitch	violent	narrow

SCORE_____ %

H	a	b	c	d
1. moisture	thicket	dryness	resist	mutter
2. composite	single	compete	honey	jade
3. imitate	increase	lizard	create	envy
4. abundant	ruffle	hostile	anxious	scarce
5. tender	harsh	trickle	rubble	extinct
6. wither	wit	flourish	equip	resist
7. foreign	district	majesty	domestic	fossil
8. unique	urban	similar	chant	lute
9. reprove	disrupt	justice	request	praise
10. perplex	clarify	stammer	pearl	greed

SCORE_____ %

I	a	b	c	d
1. calm	tradition	hysterical	appraise	cord
2. sullen	summon	herb	amiable	robust
3. temporary	utter	tension	permanent	tow
4. delicate	rough	drone	majesty	robot
5. horizontal	miracle	ancestor	hoax	vertical
6. advantage	aloft	obstacle	logic	longitude
7. fantastic	depot	finance	ordinary	navigate
8. defend	emanate	duct	narrate	attack
9. praise	port	reproach	gesture	kin
10. ascent	jade	discus	descent	vise

SCORE _____ %

BERKELEY UNIFIED SCHOOL DISTRICT
CURRICULUM CENTER

MacMillan

Word Opposites (Group) Test
(Grades 3-6)

ANSWER KEY AND SCORING STANDARDS

Level	Text
A (1)	OPENING BOOKS, A MAGIC BOX THINGS YOU SEE, WORLDS OF WONDER LANDS OF PLEASURE
B (2-1)	ENCHANTED GATES
C (2-2)	SHINING BRIDGES
D (3-1)	BETTER THAN GOLD
E (3-2)	MORE THAN WORDS
F (4)	THE MAGIC WORD
G (5)	BOLD JOURNEYS
H (6)	INTO NEW WORLDS

Scoring Standards

READING LEVELS	No. of words correct out of 10	% of accuracy
Free Reading Levels (Easy: Pupil can read with profit without any teacher help.)	10 9	100% 90%
Instructional Levels (Suitable: Pupil usually needs teacher guidance for comprehension and interpretation).	8 7	80% 70%
Frustration Levels (Too difficult: Pupil cannot read with profit even with teacher help.)	65% - 0	60% - 0

Prepared by: Russell Saunders, Consulting Teacher

MacMILLAN MacMILLAN

WORD OPPOSITES TEST

Directions: Pick a word in each line which means the opposite or nearly the opposite of the numbered word. Draw a line under it.
Example: 1. no oh yes not

NAME_____

DATE_____

TEACHER_____

A		a	b	c
1.	come	with	go	up
2.	little	will	you	big
3.	then	soon	find	now
4.	night	black	day	sleep
5.	sits	right	best	stands
6.	into	away	out	run
7.	took	from	tell	gave
8.	over	after	back	under
9.	hard	soft	hurt	wet
10.	yell	thief	whisper	float

SCORE _____ %

B		a	b	c	d
1.	coming	getting	going	riding	our
2.	under	over	opened	fast	some
3.	tall	gone	keep	head	started
4.	hungry	cried	afraid	glad	full
5.	pulled	pushed	poor	sure	kept
6.	soft	ice	hard	wait	above
7.	left	only	real	right	angry
8.	secret	held	known	goodness	unhappy
9.	smart	top	fix	husband	stupid
10.	shiny	dull	fallen	ugly	frowned

SCORE _____ %

C		a	b	c	d
1.	front	buy	behind	large	nothing
2.	park	small	dark	rode	drive
3.	loud	sound	bad	supper	quiet
4.	passed	followed	stood	above	move
5.	bottom	beginning	top	plenty	low
6.	lifted	stretched	dropped	lazy	toward
7.	suddenly	chase	noisy	slowly	wild
8.	huge	terrible	curled	tiny	awful
9.	anybody	nobody	somebody	stared	pointed
10.	truth	truely	lies	falsely	different

SCORE _____ %

D		a	b	c	d
1.	young	carried	old	queer	sorry
2.	lead	against	child	follow	lady
3.	broken	course	promise	whole	smooth
4.	weak	heart	strong	daughter	wander
5.	enters	silently	spread	leaves	narrow
6.	raised	heavier	lowered	further	split
7.	beggar	pioneers	haul	giver	chuckled
8.	future	easier	past	forward	happily
9.	fresh	stale	usual	dining	crispy
10.	ashore	evening	afloat	strode	surface

SCORE _____ %

E		a	b	c	d
1.	retreat	defeated	liberty	advance	opposite
2.	honor	disgrace	memorial	statue	defend
3.	calmly	perfect	inward	excitedly	shoved
4.	accept	ourselves	metal	superman	reject
5.	cruel	tender	flushed	meant	bouquet
6.	entrance	warrior	exit	office	heliport
7.	miserable	depend	proper	comfortable	serious
8.	wrinkled	yourselves	pressed	uniform	military
9.	strength	carrots	realize	expensive	weakness
10.	wealth	poverty	freedom	success	usable

SCORE _____ %

F		a	b	c	d
1.	capture	native	release	amaze	foresight
2.	waste	entire	belief	pinch	save
3.	mild	support	tenderness	husky	harsh
4.	firm	feeble	strict	mood	unfair
5.	regular	somewhat	odd	venture	paddle
6.	increase	tradition	lessen	spout	banner
7.	tough	twitch	pretend	frail	lei
8.	dent	cane	rifle	bulge	shrug
9.	sloppy	neat	windshield	juggler	mound
10.	patient	clue	restless	cricket	editor

SCORE _____ %

G		a	b	c	d
1.	majority	mammoth	minority	occur	force
2.	expand	patience	inspect	contract	reserve
3.	provide	energy	elect	deny	stubborn
4.	tense	shock	relaxed	growl	limit
5.	attempt	quality	product	avoid	accident
6.	hollow	cannon	solid	disk	beacon
7.	dense	cleat	convince	sparse	butler
8.	spectator	season	outfit	performer	curse
9.	perish	survive	famine	trance	gait
10.	coil	civics	unwind	granite	jog

SCORE _____ %

H		a	b	c	d
1.	infinite	igneous	limited	gauge	evolve
2.	handicap	advantage	lithe	synthetic	wretched
3.	trivial	negative	electrode	important	careen
4.	critical	subtle	conservative	dilute	approving
5.	romantic	practical	muzzle	precise	isolate
6.	obstruct	forge	assist	anticipate	palpitate
7.	ascend	astern	traveler	descend	haven
8.	popular	outrageous	disliked	accord	propel
9.	certain	climax	cylinder	shutter	doubtful
10.	distribute	gather	gauge	beaker	radar

SCORE _____ %

MacMILLAN MacMILLAN

WORD OPPOSITES TEST

Directions: Pick a word in each line which means the opposite or nearly the opposite of the numbered word. Draw a line under it.
Example: 1. no oh yes not

NAME_____

DATE_____

TEACHER_____

A		a	b	c
1.	come	with	go	up
2.	little	will	you	big
3.	then	soon	find	now
4.	night	black	day	sleep
5.	sits	right	best	stands
6.	into	away	out	run
7.	took	from	tell	gave
8.	over	after	back	under
9.	hard	soft	hurt	wet
10.	yell	thief	whisper	float

SCORE _____ %

B		a	b	c	d
1.	coming	getting	going	riding	our
2.	under	over	opened	fast	some
3.	tall	gone	keep	head	started
4.	hungry	cried	afraid	glad	full
5.	pulled	pushed	poor	sure	kept
6.	soft	ice	hard	wait	above
7.	left	only	real	right	angry
8.	secret	held	known	goodness	unhappy
9.	smart	top	fix	husband	stupid
10.	shiny	dull	fallen	ugly	frowned

SCORE _____ %

C		a	b	c	d
1.	front	buy	behind	large	nothing
2.	park	small	dark	rode	drive
3.	loud	sound	bad	supper	quiet
4.	passed	followed	stood	above	move
5.	bottom	beginning	top	plenty	low
6.	lifted	stretched	dropped	lazy	toward
7.	suddenly	chase	noisy	slowly	wild
8.	huge	terrible	curled	tiny	awful
9.	anybody	nobody	somebody	stared	pointed
10.	truth	truely	lies	falsely	different

SCORE _____ %

D		a	b	c	d
1.	young	carried	old	queer	sorry
2.	lead	against	child	follow	lady
3.	broken	course	promise	whole	smooth
4.	weak	heart	strong	daughter	wander
5.	enters	silently	spread	leaves	narrow
6.	raised	heavier	lowered	further	split
7.	beggar	pioneers	haul	giver	chuckled
8.	future	easier	past	forward	happily
9.	fresh	stale	usual	dining	crispy
10.	ashore	evening	afloat	strode	surface

SCORE _____ %

E		a	b	c	d
1.	retreat	defeated	liberty	advance	opposite
2.	honor	disgrace	memorial	statue	defend
3.	calmly	perfect	inward	excitedly	shoved
4.	accept	ourselves	metal	superman	reject
5.	cruel	tender	flushed	meant	bouquet
6.	entrance	warrior	exit	office	heliport
7.	miserable	depend	proper	comfortable	serious
8.	wrinkled	yourselves	pressed	uniform	military
9.	strength	carrots	realize	expensive	weakness
10.	wealth	poverty	freedom	success	usable

SCORE _____ %

F		a	b	c	d
1.	capture	native	release	amaze	foresight
2.	waste	entire	belief	pinch	save
3.	mild	support	tenderness	husky	harsh
4.	firm	feeble	strict	mood	unfair
5.	regular	somewhat	odd	venture	paddle
6.	increase	tradition	lessen	spout	banner
7.	tough	twitch	pretend	frail	lei
8.	dent	cane	rifle	bulge	shrug
9.	sloppy	neat	windshield	juggler	mound
10.	patient	clue	restless	cricket	editor

SCORE _____ %

G		a	b	c	d
1.	majority	mammoth	minority	occur	force
2.	expand	patience	inspect	contract	reserve
3.	provide	energy	elect	deny	stubborn
4.	tense	shock	relaxed	growl	limit
5.	attempt	quality	product	avoid	accident
6.	hollow	cannon	solid	disk	beacon
7.	dense	cleat	convince	sparse	butler
8.	spectator	season	outfit	performer	curse
9.	perish	survive	famine	trance	gait
10.	coil	civics	unwind	granite	jog

SCORE _____%

H		a	b	c	d
1.	infinite	igneous	limited	gauge	evolve
2.	handicap	advantage	lithe	synthetic	wretched
3.	trivial	negative	electrode	important	careen
4.	critical	subtle	conservative	dilute	approving
5.	romantic	practical	muzzle	precise	isolate
6.	obstruct	forge	assist	anticipate	palpitate
7.	ascend	astern	traveler	descend	haven
8.	popular	outrageous	disliked	accord	propel
9.	certain	climax	cylinder	shutter	doubtful
10.	distribute	gather	gauge	beaker	radar

SCORE _____%

BERKELEY UNIFIED SCHOOL DISTRICT
Curriculum Center
841 Folger

WORD RECOGNITION TEST CARDS

FOR

	Pages
Bank Street Readers	1 - 3
Harper & Row Basic Readers	4 - 6
The MacMillan Reading Program (Harris)	7 - 9
Scott, Foresman OPEN HIGHWAYS Readers	10

GENERAL DIRECTIONS

The word cards in this booklet are to be read by the pupil.

Record pupil responses on a separate WORD RECOGNITION SCORING SHEET. Use a separate sheet for each pupil tested.

SCORING DIRECTIONS

Refer to the directions on the WORD RECOGNITION SCORING SHEET for directions for recording pupil responses.

Determine reading levels described below by using the following percentage scores:

	No. of words correct out of 20	% of accuracy
FREE READING LEVELS (Easy: Pupil can read with profit without any teacher help.)	20	100%
	19	95%
INSTRUCTIONAL LEVELS (Suitable: Pupil usually needs teacher guidance for comprehension and interpretation.)	18	90%
	17	85%
	16	80%
	15	75%
	14	70%
FRUSTRATION LEVELS (Too difficult: Pupil cannot read with profit even with teacher help.)	13 - 0	65% - 0%

BANK BANK BANK

WORD RECOGNITION TEST--(Card I)

A	B	C
house	but	faster
street	me	lap
go	his	first
they	drill	place
school	rained	opened
on	grandmother	noisy
morning	said	faraway
say	cat	things
who	gave	door
is	win	tried
at	your	black
she	no	today
have	fell	each
yes	walked	safe
stop	way	we're
ice cream	lived	backward
trucks	snowplow	alike
fireman	wanted	share
birds	highways	hole
free	rolled	bread

BANK BANK BANK

WORD RECOGNITION TEST - -(Card 2)

D	E	F
soon	quite	closes
while	which	core
animals	tomatoes	bother
bed	mouth	burning
nine	scare	wrinkled
terrible	licked	person
friendly	squeaky	bank
fish	babies	goodness
castle	palace	rhymes
roared	deep	future
teeth	seal	happiness
cracks	brought	tasted
snowflakes	suddenly	needle
loose	rode	shopped
stay	been	gulls
mice	butterflies	fairies
games	returning	wedding
cloud	traveler	wandering
crazy	added	fifty
grade	stony	branches

BANK BANK BANK

WORD RECOGNITION TEST - - (Card 3)

G

shivered
forts
minute
tag
screens

pigeons
also
exactly
ink
shrill

pilot
pair
flipped
fair
stall

creep
starve
muddy
tease
slapped

HARPER HARPER HARPER

WORD RECOGNITION TEST - - (Card I)

A	B	C
and	play	him
here	now	girl
I	do	of
can	red	dime
go	going	give
the	at	skates
socks	too	bed
in	morning	why
two	said	pond
Mother	your	brown
Daddy	will	sun
with	big	by
to	what	legs
you	he	colt
want	did	sheep
have	fly	feel
like	old	door
good	town	talk
a	someone	football
make	tell	show

HARPER HARPER HARPER

WORD RECOGNITION TEST - - (Card 2)

D	E	F
hark	teacher	soon
around	each	doghouse
start	names	hero
called	ourselves	wrong
wanted	stripes	lake
find	arithmetic	locks
zoo	been	turn
when	finger	pays
himself	nails	kid
trip	drink	goal
young	believe	slippers
warm	stopped	breakfast
peeped	always	gave
an	flowers	piled
under	store	whiskers
dry	food	hope
patted	land	danced
spell	five	tulips
black	leave	since
knew	lamps	prize

HARPER HARPER HARPER

WORD RECOGNITION TEST -- (Card 3)

G	H	I
size	really	gavel
nurse	cottage	stir
both	exclaimed	noticed
penny	toward	lap
often	Mama	depend
state	thought	microbes
blocks	wiggled	twisted
fur	custom	freezer
heard	tiger	located
spends	lots	graceful
antlers	hoops	served
brother	drown	borders
sum	kettle	seaport
reason	hearts	suggested
buzzed	janitor	frame
castle	tore	paw
met	protecting	pebbles
shall	creaking	tug
waltz	carving	domes
impossible	magazines	throat

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WORD RECOGNITION TEST - - (Card I)

A	B	C
and	up	we
rides	here	picnic
who	go	good
can	didn't	bounce
with	something	run
policemen	ran	oh
can't	come	tricks
the	you	bus
play	Daddy	man
said	comes	talk
I	for	my
ball	makes	light
get	like	three
want	yellow	just
to	looks	looked
cowboys	yes	from
a	see	hurry
bike	boy	word
not	green	flew
is	stop	peanuts

MacMillan MacMillan MacMillan

WORD RECOGNITION TEST - - (Card 2)

D	E	F
street	getting	printing
liked	outside	watched
cry	keep	everybody
six	oldest	fourth
yelling	library	voice
together	I'm	playful
puppy	sugar	language
next	kite	squirrel
came	hobby	reached
last	soft	group
old	tail	pouring
bone	cellar	awful
fair	goodness	wrong
mad	dance	acting
people	popped	post
horse	spring	paw
noise	almost	often
mountain	fires	tracks
meow	left	snake
kind	trip	bottom

MacMillan MacMillan MacMillan

WORD RECOGNITION TEST - - (Card 3)

G	H
attention	electric
board	approve
minute	rushed
farther	calmly
sighed	alphabet
dislike	tangled
trotted	teammates
cottages	glanced
gentle	raccoons
explode	recognize
supports	slanted
invented	entrance
haul	seize
marry	trout
cider	guards
saucepan	amazing
gowns	mistakes
fruit	harbor
queer	protect
immediately	eagle

OPEN HIGHWAYS OPEN HIGHWAYS OPEN HIGHWAYS

WORD RECOGNITION TEST - - (Card I)

A	B	C
rack	dumped	messy
bottle cap	toothpick	sparkling
horsecars	fought	bathrobe
fireworks	jailer	press
bet	stroked	thief
grip	tend	uncombed
pal	lack	shaggy
steep	frog	remained
pill	wherever	eyelashes
sparks	creep	armored
failed	sink	team
kingdom	frozen	resist
fluff	main	dinosaurs
slide	drum	dozen
frame	beaks	clutching
date	hem	correct
sport	fin	strictly
fed	hike	concerned
sneeze	cannon	spoiled
rose	pest	reptiles

BANK BANK BANK

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in response columns:

correct word ✓

mispronunciation) (write word said)
substitution)
refusal (after 5 seconds) R

To get percentage of accuracy multiply number of errors by 5 and deduct total from 100.

Pupil _____

Date _____

Instructional Levels _____

_____

Teacher _____

A (Pre-Primer)

1.	house	_____
2.	street	_____
3.	go	_____
4.	they	_____
5.	school	_____
6.	on	_____
7.	morning	_____
8.	say	_____
9.	who	_____
10.	is	_____
11.	at	_____
12.	she	_____
13.	have	_____
14.	yes	_____
15.	stop	_____
16.	ice cream	_____
17.	trucks	_____
18.	fireman	_____
19.	birds	_____
20.	free	_____

Score _____ %

In the City

People Read

B (Primer)

but	_____
me	_____
his	_____
drill	_____
rained	_____
grandmother	_____
said	_____
cat	_____
gave	_____
win	_____
your	_____
no	_____
fell	_____
walked	_____
way	_____
lived	_____
snowplow	_____
wanted	_____
highways	_____
rolled	_____

Score _____ %

Around the City

C (First)

faster	_____
lap	_____
first	_____
place	_____
opened	_____
noisy	_____
faraway	_____
things	_____
door	_____
tried	_____
black	_____
today	_____
each	_____
safe	_____
we're	_____
backward	_____
alike	_____
share	_____
hole	_____
bread	_____

Score _____ %

Uptown, Downtown

BANK

BANK

BANK

D (Second - 1)

1. soon _____
2. while _____
3. animals _____
4. bed _____
5. nine _____
6. terrible _____
7. friendly _____
8. fish _____
9. castle _____
10. roared _____
11. teeth _____
12. cracks _____
13. snowflakes _____
14. loose _____
15. stay _____
16. mice _____
17. games _____
18. cloud _____
19. crazy _____
20. grade _____

Score_____%

My City

E (Second - 2)

quite _____
which _____
tomatoes _____
mouth _____
scare _____
licked _____
squeaky _____
babies _____
palace _____
deep _____
seal _____
brought _____
suddenly _____
rode _____
been _____
butterflies _____
returning _____
traveler _____
added _____
stony _____

Score_____%

Green Light, Go

F (Third - 1)

closes _____
core _____
bother _____
burning _____
wrinkled _____
person _____
bank _____
goodness _____
rhymes _____
future _____
happiness _____
tasted _____
needle _____
shopped _____
gulls _____
fairies _____
wedding _____
wandering _____
fifty _____
branches _____

SCORE_____%

City Sidewalks

BANK BANK BANK

G (Third - 2)

1. shivered _____
2. forts _____
3. minute _____
4. tag _____
5. screens _____
6. pigeons _____
7. also _____
8. exactly _____
9. ink _____
10. shrill _____
11. pilot _____
12. pair _____
13. flipped _____
14. fair _____
15. stall _____
16. creep _____
17. starve _____
18. muddy _____
19. tease _____
20. slapped _____

SCORE_____%

Round the Corner

HARPER HARPER HARPER

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in response columns:

correct word ✓

mispronunciation, substitution (write word said)

refusal (after 5 seconds) R

To get percentage of accuracy multiply number of errors by 5 and deduct total from 100.

Pupil _____

Date _____

Instructional Levels _____

_____

Teacher _____

A (Pre-Primers 1 and 2)		B (Pre-Primers 3 and 4)		C (Primer)	
1. and	_____	play	_____	him	_____
2. here	_____	now	_____	girl	_____
3. I	_____	do	_____	of	_____
4. can	_____	red	_____	dime	_____
5. go	_____	going	_____	give	_____
6. the	_____	at	_____	skates	_____
7. socks	_____	too	_____	bed	_____
8. in	_____	morning	_____	why	_____
9. two	_____	said	_____	pond	_____
10. Mother	_____	your	_____	brown	_____
11. Daddy	_____	will	_____	sun	_____
12. with	_____	big	_____	by	_____
13. to	_____	what	_____	legs	_____
14. you	_____	he	_____	colt	_____
15. want	_____	did	_____	sheep	_____
16. have	_____	fly	_____	feel	_____
17. like	_____	old	_____	door	_____
18. good	_____	town	_____	talk	_____
19. a	_____	someone	_____	football	_____
20. make	_____	tell	_____	show	_____
Score	_____ %	Score	_____ %	Score	_____ %

Janet and Mark

Outdoors and In

City Days, City Ways

Just for Fun

Around the Corner

HARPER HARPER HARPER

D (First-1)		E (First -2)		F (Second-1)	
1. hark	_____	teacher	_____	soon	_____
2. around	_____	each	_____	doghouse	_____
3. start	_____	names	_____	hero	_____
4. called	_____	ourselves	_____	wrong	_____
5. wanted	_____	stripes	_____	lake	_____
6. find	_____	arithmetic	_____	locks	_____
7. zoo	_____	been	_____	turn	_____
8. when	_____	finger	_____	pays	_____
9. himself	_____	nails	_____	kid	_____
10. trip	_____	drink	_____	goal	_____
11. young	_____	believe	_____	slippers	_____
12. warm	_____	stopped	_____	breakfast	_____
13. peeped	_____	always	_____	gave	_____
14. an	_____	flowers	_____	piled	_____
15. under	_____	store	_____	whiskers	_____
16. dry	_____	food	_____	hope	_____
17. patted	_____	land	_____	danced	_____
18. spell	_____	five	_____	tulips	_____
19. black	_____	leave	_____	since	_____
20. knew	_____	lamps	_____	prize	_____
Score _____ %		Score _____ %		Score _____ %	
Real and Make-Believe		From Elephants to Eskimos		All Through the Year	

HARPER HARPER HARPER

G (Second-2)		H (Third-1)		I (Third-2)	
1. size	_____	really	_____	gavel	_____
2. nurse	_____	cottage	_____	stir	_____
3. both	_____	exclaimed	_____	noticed	_____
4. penny	_____	toward	_____	lap	_____
5. often	_____	Mama	_____	depend	_____
6. state	_____	thought	_____	microbes	_____
7. blocks	_____	wiggled	_____	twisted	_____
8. fur	_____	custom	_____	freezer	_____
9. heard	_____	tiger	_____	located	_____
10. spends	_____	lots	_____	graceful	_____
11. antlers	_____	hoops	_____	served	_____
12. brother	_____	drown	_____	borders	_____
13. sum	_____	kettle	_____	seaport	_____
14. reason	_____	hearts	_____	suggested	_____
15. buzzed	_____	janitor	_____	frame	_____
16. castle	_____	tore	_____	paw	_____
17. met	_____	protecting	_____	pebbles	_____
18. shall	_____	creaking	_____	tug	_____
19. waltz	_____	carving	_____	domes	_____
20. impossible	_____	magazines	_____	throat	_____
Score _____%		SCORE _____%		SCORE _____%	
From Fins to Feathers		From Faraway Places		From Bicycles to Boomerangs	

MacMillan MacMillan MacMillan

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in response columns:

correct word ✓

mispronunciation)
substitution) (write word said)
refusal (after 5 seconds) R

To get percentage of accuracy multiply number of errors by 5 and deduct total from 100.

Pupil _____

Date _____

Instructional Levels _____

_____

Teacher _____

A (Pre-Primer I)		B (Pre-Primers 2 and 3)		C (Primer)	
1. and	_____	up	_____	we	_____
2. rides	_____	here	_____	picnic	_____
3. who	_____	go	_____	good	_____
4. can	_____	didn't	_____	bounce	_____
5. with	_____	something	_____	run	_____
6. policemen	_____	ran	_____	oh	_____
7. can't	_____	come	_____	tricks	_____
8. the	_____	you	_____	bus	_____
9. play	_____	Daddy	_____	man	_____
10. said	_____	comes	_____	talk	_____
11. I	_____	for	_____	my	_____
12. ball	_____	makes	_____	light	_____
13. get	_____	like	_____	three	_____
14. want	_____	yellow	_____	just	_____
15. to	_____	looks	_____	looked	_____
16. cowboys	_____	yes	_____	from	_____
17. a	_____	see	_____	hurry	_____
18. bike	_____	boy	_____	word	_____
19. not	_____	green	_____	flew	_____
20. is	_____	stop	_____	peanuts	_____
Score	_____ %	Score	_____ %	Score	_____ %
Opening Books		A Magic Box Things You See		Worlds of Wonder	

MacMillan

D(First - 1)

1.	street	_____
2.	liked	_____
3.	cry	_____
4.	six	_____
5.	yelling	_____
6.	together	_____
7.	puppy	_____
8.	next	_____
9.	came	_____
10.	last	_____
11.	old	_____
12.	bone	_____
13.	fair	_____
14.	mad	_____
15.	people	_____
16.	horse	_____
17.	noise	_____
18.	mountain	_____
19.	meow	_____
20.	kind	_____

Score _____%

Lands of Pleasure

MacMillan

E (Second-1)

1.	getting	_____
2.	outside	_____
3.	keep	_____
4.	oldest	_____
5.	library	_____
6.	I'm	_____
7.	sugar	_____
8.	kite	_____
9.	hobby	_____
10.	soft	_____
11.	tail	_____
12.	cellar	_____
13.	goodness	_____
14.	dance	_____
15.	popped	_____
16.	spring	_____
17.	almost	_____
18.	fires	_____
19.	left	_____
20.	trip	_____

Score _____%

Enchanted Gates

MacMillan

F (Second-2)

1.	printing	_____
2.	watched	_____
3.	everybody	_____
4.	fourth	_____
5.	voice	_____
6.	playful	_____
7.	language	_____
8.	squirrel	_____
9.	reached	_____
10.	group	_____
11.	pouring	_____
12.	awful	_____
13.	wrong	_____
14.	acting	_____
15.	post	_____
16.	paw	_____
17.	often	_____
18.	tracks	_____
19.	snake	_____
20.	bottom	_____

Score _____%

Shining Bridges

MacMillan MacMillan MacMillan

G (Third-1)

1.	attention	_____
2.	board	_____
3.	minute	_____
4.	farther	_____
5.	sighed	_____
6.	dislike	_____
7.	trotted	_____
8.	cottages	_____
9.	gentle	_____
10.	explode	_____
11.	supports	_____
12.	invented	_____
13.	haul	_____
14.	marry	_____
15.	cider	_____
16.	saucepan	_____
17.	gowns	_____
18.	fruit	_____
19.	queer	_____
20.	immediately	_____

Score _____%

Better than Gold

H (Third-2)

	electric	_____
	approve	_____
	rushed	_____
	calmly	_____
	alphabet	_____
	tangled	_____
	teammates	_____
	glanced	_____
	raccoons	_____
	recognize	_____
	slanted	_____
	entrance	_____
	seize	_____
	trout	_____
	guards	_____
	amazing	_____
	mistakes	_____
	harbor	_____
	protect	_____
	eagle	_____

Score _____%

More than Words

OPEN HIGHWAYS
Book 4

OPEN HIGHWAYS
Book 4

OPEN HIGHWAYS
Book 4

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in response columns:

correct word ✓

misprounciation)
substitution) (write word said)
refusal (after 5 seconds) R

To get percentage of accuracy multiply number of errors by 5 and deduct total from 100.

Pupil _____

Date _____

Instructional Levels _____

Teacher _____

A		B		C	
1.	rack	dumped		messy	
2.	bottle cap	toothpick		sparkling	
3.	horsecars	fought		bathrobe	
4.	fireworks	jailer		press	
5.	bet	stroked		thief	
6.	grip	tend		uncombed	
7.	pal	lack		shaggy	
8.	steep	frog		remained	
9.	pill	wherever		eyelashes	
10.	sparks	creep		armored	
11.	failed	sink		team	
12.	kingdom	frozen		resist	
13.	fluff	main		dinosaurs	
14.	slide	drum		dozen	
15.	frame	beaks		clutching	
16.	date	hem		correct	
17.	sport	fin		strictly	
18.	fed	hike		concerned	
19.	sneeze	cannon		spoiled	
20.	r	pest		reptiles	
Score	_____ %	Score	_____ %	Score	_____ %
(Sections 1 and 2 Pages 9 - 139 R.L. 2^{-1} - 2^{-2})		(Sections 3-5 Pages 140-371 R.L. 3^{-1} - 3^{-2})		(Section 6 Pages 372-457 R.L. 3^{-2} - 4^{-1})	

TEST PAGES IN THIS HANDBOOK HAVE BEEN REDUCED. FOR FULL-SIZE COPIES WRITE TO: Russell W. Saunders, Jr., Coordinator of Reading, Berkeley Unified School District, 1720 Oregon Street, Berkeley, California, 94703.

ABSTRACT

A STUDY OF THE READABILITY OF READING TEXTBOOKS ADOPTED FOR USE IN CALIFORNIA ELEMENTARY SCHOOLS

By

Russell W. Saunders, Jr.

B.S. of Elem. Ed. Oregon College of Education, 1955
B.S. University of Oregon, 1955
M.S. University of Oregon, 1957

Shirley B. Finnegan

Shirley B. Finnegan, Ph.D., Advisor
Reading Specialist, Berkeley Unified
School District, Berkeley, California

A Dissertation Submitted in Partial Fulfillment of
The Requirements for the Degree of
Doctor of Philosophy

Walden University
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The Problem

New textbooks in reading were adopted for use in California elementary schools beginning with the 1969-70 school year. Three collections of textbooks were adopted for culturally disadvantaged, slow, average, and fast student groups. The vocabulary in the collections had been studied and described in subjective, rather than objective terms. No readability data had been secured by means of formula application. Therefore, the purpose of this study was to determine if there was a significant difference in the readability of reading textbooks adopted for four student groups.

Methods and Procedures

The Botel readability formula, contained in Predicting Reading Levels, was applied to nine, 100-word samples taken from a total of twenty-four textbooks. The sign test for significant differences was applied in an inter-textbook comparison of readability levels of each of the nine samples across the three collections. The data were inspected, further, to determine intra-textbook variations in readability levels among the nine samples.

The interquartile range ($Q_3 - Q_1$) was calculated for each of the nine, 100-word samples taken from the twenty-four textbooks. The data were inspected to determine if there was a difference in the range of readability levels of

the textbooks in a comparison among the three collections. The sign test for significant differences was applied, a second time, in an inter-textbook comparison of the interquartile ranges.

Findings

Readability levels of textbooks, adopted for culturally disadvantaged students, were significantly lower than readability levels of textbooks adopted for slow and average students in grades one, two, and three, in three of the five comparisons made.

Readability levels of textbooks, adopted for slow and average students, were significantly higher than textbooks adopted for fast students in grades one, two, and three, in two of the five comparisons made.

The readability level of the fifth-grade textbook, adopted for culturally disadvantaged and slow students, was significantly lower than the readability level of the textbook adopted for the fast students.

Textbooks, adopted for fast students, achieved the best publisher's grade assignment--readability level, match. Additional variations in readability levels were observed within the nine samples in each of the twenty-four textbooks.

The interquartile range of the nine samples increased appreciably, starting at the third reader, part two level,

but no significant differences were obtained in interquartile ranges when comparisons were made among the three collections.